

QUALITY ASSURANCE PROJECT PLAN
29 Riverside Avenue Site (Phase 2 Assessment)
Newark, New Jersey

Amendment 1

Prepared for:
United States Environmental Protection Agency/Environmental Response Team
Edison, New Jersey

By:
Lockheed Martin/Scientific, Engineering, Response and Analytical Services (SERAS)
Work Assignment Number: SERAS-089

Based on the Intergovernmental Data Quality Task Force Uniform
Federal Policy for Quality Assurance Project Plans
(Final Version 1.1, June 2006)

February 23, 2011

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QAPP Worksheet #1
Title and Approval Page

Site Name/Project Name: 29 Riverside Avenue Site (Phase 2 Assessment)
Site Location: Newark, New Jersey

Document Title: Quality Assurance Project Plan for 29 Riverside Avenue Site (Phase 2 Assessment)

Lead Organization: Environmental Protection Agency/Environmental Response Team (EPA/ERT)

Preparer's Name and Organizational Affiliation: Martin Ebel, Lockheed Martin/Scientific, Engineering, Response and Analytical Services (SERAS)

Preparer's Address, Telephone Number, and E-mail Address: 2890 Woodbridge Avenue, Edison, New Jersey 08837, (732) 321-4269, martin.t.ebel@lmco.com

Preparation Date (Day/Month/Year): February 23, 2011

Investigative Organization's Project Manager/Date:

 2/24/11
Signature

Printed Name/Organization: Don Bussey/ERT Work Assignment Manager

Investigative Organization's Project QA Officer/Date:

 2/20/11
Signature

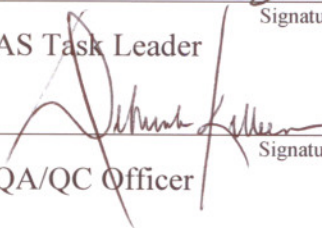
Printed Name/Organization: Stephen Blaze/ERT Quality Coordinator

Lead Organization's Project Manager/Date:

 2/24/11
Signature

Printed Name/Organization: Martin Ebel/SERAS Task Leader

Approval Signatures/Date:

 2/23/11
Signature

Printed Name/Title: Deborah Killeen/SERAS QA/QC Officer

Approval Authority:

Other Approval Signatures/Date:

 2/23/11
Signature

Printed Name/Title: Dennis A. Miller/SERAS Program Manager

Document Control Numbering System: SERAS-089-DQAPPA1-022311

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP
Revision Number: 1.0
Revision Date: 02/23/11
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QAPP Worksheet #2
QAPP Identifying Information

Site Name/Project Name: Phase 2 Assessment Riverside Avenue Site

Site Location: Newark, New Jersey

Site Number/Code: 02PC

Operable Unit:

Contractor Name: Lockheed Martin

Contractor Number: EP-W-09-031

Contract Title: SERAS

Work Assignment Number: SERAS-089

1. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

2. Identify approval entity: EPA/ERT for Region 2

3. The QAPP is (select one): ☐Generic ☒Project Specific

4. List dates of scoping sessions that were held: NA

5. List dates and titles of QAPP documents written for previous site work, if applicable:

Title	Approval Date
-------	---------------

Quality Assurance Project Plan for Riverside Avenue Site, Newark, New Jersey, Response Scientific Engineering Response and Analytical Services (SERAS), document # SERAS-089-DQAPP-062310	06/23/10

6. List organizational partners (stakeholders) and connection with lead organization:
EPA Region 2

7. List data users:
EPA Region 2

8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusions below:

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	11 12

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
2.7 Secondary Data Evaluation	<ul style="list-style-type: none"> - Sources of Secondary Data and Information - Secondary Data Criteria and Limitations Table 	13
2.8 Project Overview and Schedule	<ul style="list-style-type: none"> - Summary of Project Tasks 	14
2.8.1 Project Overview	<ul style="list-style-type: none"> - Reference Limits and Evaluation Table 	15
2.8.2 Project Schedule	<ul style="list-style-type: none"> - Project Schedule/Timeline Table 	16
Measurement/Data Acquisition		
3.1 Sampling Tasks	<ul style="list-style-type: none"> - Sampling Design and Rationale 	17
3.1.1 Sampling Process Design and Rationale	<ul style="list-style-type: none"> - Sample Location Map 	Figure 1A
3.1.2 Sampling Procedures and Requirements	<ul style="list-style-type: none"> - Sampling Locations and Methods/SOP Requirements Table 	18
3.1.2.1 Sampling Collection Procedures	<ul style="list-style-type: none"> - Analytical Methods/SOP Requirements Table 	19
3.1.2.2 Sample Containers, Volume, and Preservation	<ul style="list-style-type: none"> - Field Quality Control Sample Summary Table 	20
3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures	<ul style="list-style-type: none"> - Sampling SOPs 	21
3.1.2.3 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Project Sampling SOP References Table 	22
3.1.2.4 Supply Inspection and Acceptance Procedures	<ul style="list-style-type: none"> - Field Equipment Calibration, Maintenance, Testing, and Inspection Table 	22
3.1.2.6 Field Documentation Procedures		
3.2 Analytical Tasks	<ul style="list-style-type: none"> - Analytical SOPs 	23
3.2.1 Analytical SOPs	<ul style="list-style-type: none"> - Analytical SOP References Table 	24
3.2.2 Analytical Instrument Calibration Procedures	<ul style="list-style-type: none"> - Analytical Instrument Calibration Table 	25
3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures	<ul style="list-style-type: none"> - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table 	25
3.2.4 Analytical Supply Inspection and Acceptance Procedures		

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Required Documents
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	26 27
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	29 30
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table	31 32
4.2 QA Management Reports	- QA Management Reports Table	33
4.3 Final Project Report		

QAPP Worksheet #2
QAPP Identifying Information
(Continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	Crosswalk to Related Documents
Data Review		
5.1 Overview		
5.2 Data Review Steps	- Verification (Step I) Process Table	34
5.2.1 Step I: Verification	- Validation (Steps IIa and IIb) Process Table	35
5.2.2 Step II: Validation	- Validation (Steps IIa and IIb) Summary Table	36
5.2.2.1 Step IIa Validation Activities	- Usability Assessment	37
5.2.2.2 Step IIb Validation Activities		
5.2.3 Step III: Usability Assessment		
5.2.3.1 Data Limitations and Actions from Usability Assessment		
5.2.3.2 Activities		
5.3 Streamlining Data Review		
5.3.1 Data Review Steps To Be Streamlined		
5.3.2 Criteria for Streamlining Data Review		
5.3.3 Amounts and Types of Data Appropriate for Streamlining		

**QAPP Worksheet #3
Distribution List**

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Martin Ebel	Geophysicist	SERAS	(732)-321-4241	(732)-494-4021	martin.t.ebel@lmco.com	SERAS-089-DQAPPA1-022311
Deborah Killeen	QA/QC Officer	SERAS	(732) 321-4245	(732) 494-4021	deborah.a.killeen@lmco.com	SERAS-089-DQAPPA1-022311
Dennis A. Miller	Program Manager	SERAS	(732) 321-4216	(732) 494-4021	dennis.a.miller@lmco.com	SERAS-089-DQAPPA1-022311
Donald Bussey	Work Assignment Manager (WAM)	EPA/ERT	(702) 784-8016	(702) 784-8001	bussey.don@epa.gov	SERAS-089-DQAPPA1-022311
Stephen Blaze	Quality Coordinator	EPA/ERT	(732) 906-6921	(732) 321-6724	blaze.stephen@epa.gov	SERAS-089-DQAPPA1-022311
Paul Kahn	On-Scene Coordinator (OSC)	EPA Region 2	(732) 321-6617	(732) 321-4425	Kahn.paul@epa.gov	SERAS-089-DQAPPA1-022311
David Rosoff	On-Scene Coordinator (Technical Support)	EPA Region 2	(732) 906-6879	(732) 906-6182	rosoff.david@epa.gov	SERAS-089-DQAPPA1-022311

Title: 29 Riverside Avenue Site (Phase 2 Assessment) QAPP

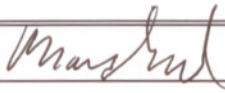

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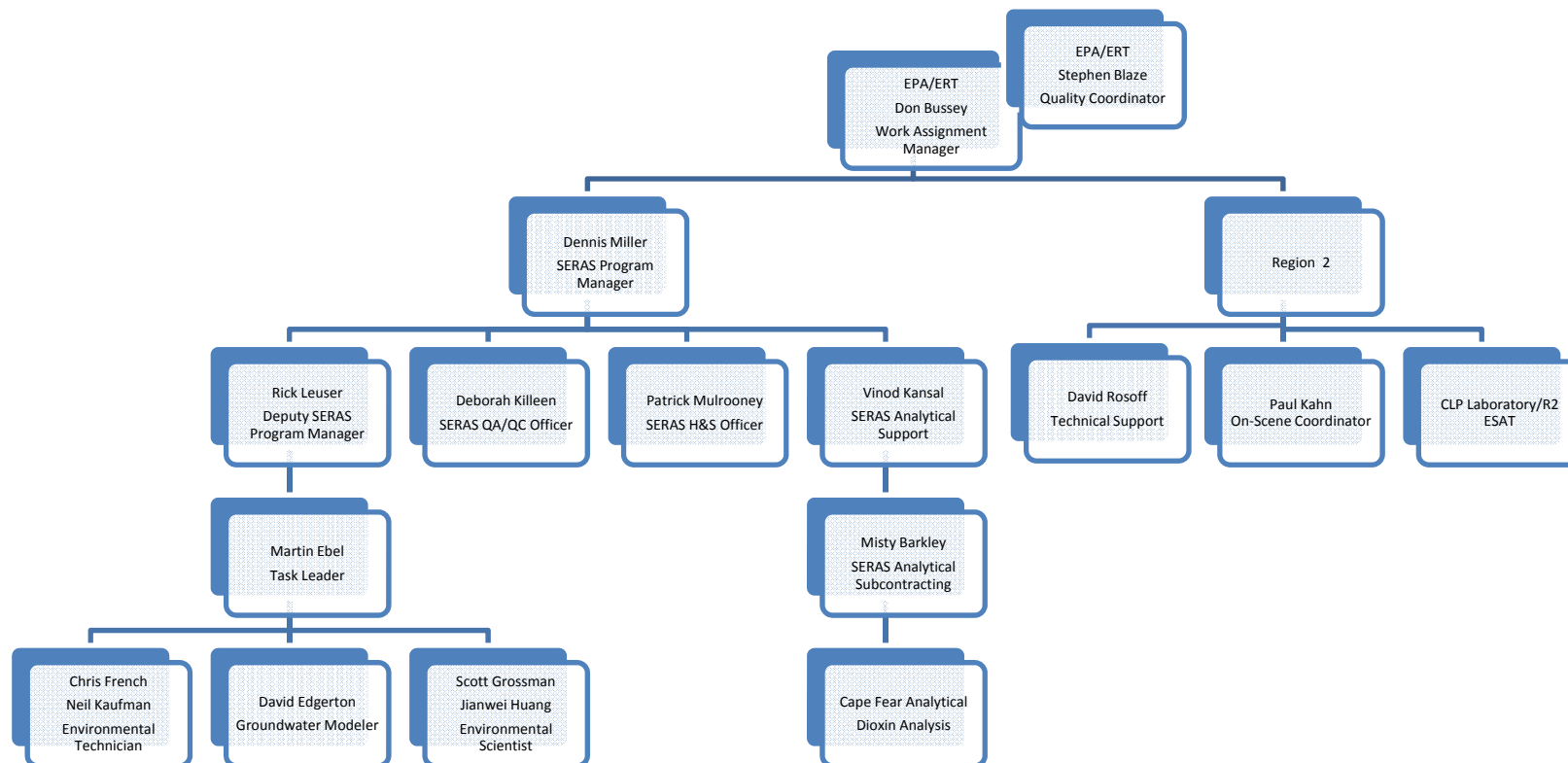
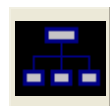
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QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: SERAS/EPA/ERT

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Martin Ebel	Geophysicist	(732)-321-4241		2/24/11
David Edgerton	Groundwater Modeler	(732)-494-4057		
Chris French	Environmental Technician	(732)-494-4040		
Scott Grossman	Environmental Scientist	(732) 321-4230		
Jianwei Huang	Environmental Scientist	(732) 321-4233		
Neil Kaufman	Environmental Technician	(732) 321-4254		
Don Bussey	Work Assignment Manager	(702) 784-8016		2/24/11
Paul Kahn	On-Scene Coordinator	(732) 906-6617		
David Rosoff	Technical Support	(732) 906-6879		

QAPP Worksheet #5 Project Organizational Chart



QAPP Worksheet #6 Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Approval of initial QAPP and any amendments	ERT Work Assignment Manager ERT Quality Coordinator SERAS Program Manager SERAS QA/QC Officer	Don Bussey Stephen Blaze Dennis A. Miller Deborah Killeen	(702) 784-8016 (732) 906-6921 (732) 321-4216 (732) 321-4245	SERAS internal peer review, followed by ERT approval, implementation of changes is effective only with approved QAPP or QAPP Change Form.
Nonconformance and Corrective Action	SERAS Task Leader ERT Work Assignment Manager SERAS QA/QC Officer	Martin Ebel Don Bussey Deborah Killeen	(732)-321-4241 (702) 784-8016 (732) 321-4245	Use of the Work Assignment Field Change Form for field issues.
Posting of Deliverables to the ERT IMS website	SERAS Task Leader SERAS QA/QC Officer SERAS Deputy Program Manager SERAS Administrative Support	Martin Ebel Deborah Killeen Richard Leuser Eileen Ciambotti	(732)-321-4241 (732) 321-4245 (732) 494-4060 (732) 321-4255	Per the work assignment, posting of deliverables to the ERT-Information Management System (IMS) website constitutes delivery to the Work Assignment Manager.
Work Assignment	SERAS Program Manager	Dennis A. Miller	(732) 321-4216	Describes scope of work to SERAS personnel from the ERT Work Assignment Manager.
Health and Safety On-Site Meeting	SERAS Task Leader	Martin Ebel	(732)-321-4241	Describe potential site hazards, required personal protective equipments, and access to local emergency services.

QAPP Worksheet #7
Personnel Responsibilities and Qualification Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Martin Ebel	Geophysicist	SERAS	Task Leader/Project Supervision, Reporting, Document preparation, Equipment maintenance	Minimum B.S. degree plus 14 years of related experience//Lockheed Martin Employee Files
Don Bussey	Work Assignment Manager	ERT	Technical Direction	EPA job-related qualifications/EPA Files
Stephen Blaze	Quality Coordinator	ERT	QA Oversight	EPA job-related qualifications/EPA Files
David Edgerton	Groundwater Modeler	SERAS	Peer review	Minimum B.S. degree plus 14 years of related experience/Lockheed Martin Employee Files
Deborah Killeen	QA/QC Officer	SERAS	QA Oversight/Deliverable Review	Minimum B.S. degree plus 14 years of related experience/Lockheed Martin Employee Files
Scott Grossman	Environmental Scientist	SERAS	Sampling Support	Minimum B.S. degree plus 8 years of related experience/Lockheed Martin Employee Files
Jianwei Huang	Environmental Scientist	SERAS	Sampling Support	Minimum B.S. degree plus 10 years of related experience/Lockheed Martin Employee Files
Chris French	Environmental Technician	SERAS	Soil and groundwater sampling, Geo Probe Operation	Environmental sampling experience/Lockheed Martin Employee Files
Neil Kaufman	Environmental Technician	SERAS	Soil and Groundwater Sampling	Environmental sampling experience/Lockheed Martin Employee Files

QAPP Worksheet #8
Special Personnel Training Requirements Table

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Project Oversight	Health and Safety 8-hour Refresher	SERAS	10/2010	Martin Ebel	Task Leader/SERAS	Health & Safety Files
Sampling Operations	Health and Safety 8-hour Refresher	SERAS	11/2010	Chris French	Environmental Technician/SERAS	Health & Safety Files
QA Oversight	Uniform Federal Policy for Quality Assurance Project Plans	Advanced Systems	January 2006	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
Sampling Operations	Health and Safety 8-hour Refresher	SERAS	07/2010	Neil Kaufman	Environmental Technician/SERAS	Health & Safety Files
Sampling Operations	Health and Safety 8-hour Refresher	SERAS	04/2010	David Edgerton	Groundwater Modeler/SERAS	Health & Safety Files
Sampling Operations	Health and Safety 8-hour Refresher	SERAS	04/2010	Jianwei Huang	Environmental Scientist/SERAS	Health & Safety Files
Sampling Operations	Health and Safety 8-hour Refresher	SERAS	11/2010	Scott Grossman	Environmental Engineer/Scientist/SERAS	Health & Safety Files
QA/Oversight Validation	Data Review and Validation	Laboratory Data Contracts	January 2007	Deborah Killeen	QA/QC Officer/SERAS	Quality Files
Validation Support	Data Integrity/Peak Integration Training	SERAS	July 2010	Raymond Varsolona Tony LoSurdo	QA/QC Chemist QA/QC Chemist	Quality Files

QAPP Worksheet #9
Project Scoping Session Participants Sheet

Project Name: Riverside Avenue Projected Date(s) of Sampling: from 2/22/11 to 3/4/11 Project Manager: Martin Ebel			Site Name: Riverside Avenue Site Location: 29 Riverside Avenue, Newark, NJ		
Date of Session: 2/1/2011 Scoping Session Purpose: Scope meeting to discuss scope of work for work assignment amendment, field tasks, planning issues etc.					
Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Don Bussey	Work Assignment Manager	ERT	(702) 784-8016	bussey.don@epa.gov	Technical Direction
Martin Ebel	Task Leader	SERAS	(732)-321-4241	martin.t.ebel@lmco.com	Task Leader
Jianwei Huang	Environmental Scientist	SERAS	(732) 321-4233	Jianwei.huang@lmco.com	Field Sampling
Scott Grossman	Environmental Scientist	SERAS	(732) 321-4230	scott.c.grossman@lmco.com	Field Sampling
Misty Barkley	Contract Laboratory Coordinator	SERAS	(732) 321-4205	misty.barkley@lmco.com	Contract Laboratory Coordinator
Deborah Killeen	QA/QC Officer	SERAS	(732)-321-4245	deborah.a.killeen@lmco.com	Quality Assurance
Rick Leuser	Deputy Program Manager	SERAS	(732)-321-4060	richard.m.leuser@lmco.com	Project Oversight /Technical Advisor

Comments/Decisions:

1. Sediment sampling at the river: to collect sediment samples from 10 locations at depths of 1.5-2.5 feet and 3.5-4.5 feet by sampling from sediment cores collected manually. The sediment samples will be analyzed for VOCs, SVOCs, TOC, Pb and grain size. Sediment sampling locations are shown in Figure 1A (SED4=SD4, SED5=SD2, SED6=SD1, SED7=SD3, SED8=SD5, SED9=SD6, SED1, 2, and are new locations). A duplicate sample will be collected for each sediment sampling depth.
2. Sediment pore water samples will be collected at depths of 3.5-4.5 feet, and the pore water samples will be analyzed for VOCs, SVOCs and Pb.
3. Sediment sampling from the basement of Building #7: to collect sediment samples at depths of 0-2 feet from up to 3 locations. The samples will be analyzed for VOCs and SVOCs.
4. Surface soil sampling (0-3 inches) for dioxin and PCBs analysis: 11 locations with total samples of 12 (including 1 duplicate). Proposed surface soil sampling locations are shown in Figure 1A (NS5=B5, NS7=B10, NS8=B11, NS9=B12, NS1, 2, 3, 4, 6, 10, and 11 are new locations).
5. Sediment sampling at depths of 1.5-2.5 feet for dioxin and PCBs analysis at 2 locations to be determined in the field.
6. QC Criteria: Precision (field): $\pm 35\%$ RPD. Dedicated sampling equipment will be used; hence, there will be no equipment/rinsate blank.
7. Proposed locations for groundwater monitor wells: GWM1: 10 feet away from river to the north of Building 7, GWM2: 150 feet away from river northwest of Building 7, GWM3: 250 feet away from river north of Building 12.
8. Pressure transducers will be placed in the three wells, the basement of Building 7 and a stilling well in the Passaic River.
9. SERAS personnel will provide vertical control for the pressure transducers

Action Items:

Ms. Barkley will obtain sub-contractor bids for 15 soil and sediment samples for dioxin analysis. Ms. Killeen will prepare an estimate of hours needed for data validation for the dioxin samples.

QAPP Worksheet #10 Problem Definition

The problem to be addressed by the project:

The Riverside Avenue site is a former paint manufacturing facility that has numerous above ground and underground storage tanks. The purpose of the first sampling event (2010) was to assess whether releases from the former operations or from the tanks have or are impacting site soil or groundwater in support of a removal assessment. Soil borings/piezometers were installed and soil and groundwater samples were collected for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals and cyanide. Surface sediment samples (0-12 inches) were collected from the Passaic River adjacent to the site.

The purpose of the second sampling event (2011) is to conduct additional field sampling to support the continuing removal assessment and to evaluate the threat of release of site-related contaminants to the Passaic River. Sediment will be collected at two depths of 1.5-2.5 feet and 3.5-4.5 feet from the Passaic River adjacent to the site. Sediment samples will be analyzed for VOCs, SVOCs, lead (Pb), total organic carbon (TOC), and grain size. Sediment samples will also be collected from the basement of Building #7 at depths of 0-2 feet, and the samples will be analyzed for VOCs and SVOCs. Sediment pore water samples will be collected from the Passaic River at the depths of 3.5-4.5 feet and analyzed for VOCs, SVOCs and Pb. Shallow groundwater monitor wells will be installed at three locations and groundwater samples will be collected for the analysis of VOCs and SVOCs. Groundwater discharge from the site toward and into the Passaic River will be evaluated by installing pressure transducers/data loggers into groundwater monitor wells, the building basement, and the Passaic River. Near-surface soil samples (0-3 inches) will be collected at selected locations to evaluate the contamination by polychlorinated biphenyls (PCBs) and dioxin. Sediment samples at the depths of 1.5-2.5 feet will be collected from two sediment sampling locations to be determined at the river for PCBs and dioxin analysis. A detailed assessment on VOC and SVOC target compounds and tentatively identified compounds (TICs) found in the field samples will be conducted to evaluate the possible association with historical industrial processes operated at the site.

The environmental questions being asked:

Do contaminants impacting the site have a potential of migrating into the Passaic River?

Observations from any site reconnaissance reports:

The site is occupied by two abandoned buildings to the south and a large barren area to the north. The Passaic River is to the east. The site is primarily flat and access to most of the site is direct. Indications of underground storage tanks and underground process lines were noted during the clearing of boring locations with geophysical methods.

A synopsis of secondary data or information from site reports:

Draft Site Investigation Report for Brick City Development Corporation, PMK Group October 2009. Contaminants were identified in site soil and groundwater. Soil, groundwater, and surface sediment samples were previously collected by SERAS personnel and the analytical results identified VOCs, SVOCs, and metal in the samples.

<p>The possible classes of contaminants and the affected matrices:</p> <p>2010 sampling: Soil - VOC, SVOC, metals and cyanide Groundwater – VOC, SVOC, metals and cyanide Surface Sediment – VOC, SVOCs and metals</p> <p>2011 sampling: Surface Soil – PCBs and dioxin Sediment from the Passiac River (~1.5-2.5 feet) – PCBs and dioxin Groundwater – VOC, SVOC Sediment from the Passiac River – VOC, SVOC, TOC, Pb and grain size Sediment from the basement of the Building #7 – VOC and SVOC Sediment pore water from the Passaic River – VOCs, SVOCs and Pb</p>
<p>The rationale for inclusion of chemical and nonchemical analyses: To rank site for National Priority List (NPL) listing. To design an effective site removal plan to clean up the site because of known site contamination.</p>
<p>Information concerning various environmental indicators: Environmental indicators obscured by land use</p>
<p>Project decision conditions (“If..., then...” statements): If contaminant concentrations in soil and sediment exceed the NJDEP Non-Residential Direct Contact Soil Remediation Standards listed in Worksheet 15 as guidance, then EPA Region 2 may evaluate the removal options for the site. If contaminant concentrations in water exceed the higher of the NJDEP Groundwater Quality Criterion (GWQC) and Practical Quantitation Level (PQL), then EPA Region 2 will use the information to determine the impact to the groundwater. If those compounds for which the higher of the NJDEP PQL and the GWQC are lower than the achievable laboratory PQL, then no decisions will be made on the usability of the data for those compounds.</p>

QAPP Worksheet #11
Project Quality Objectives /Systematic Planning Process Statements

Who will use the data? EPA Region 2 and ERT
What will the data be used for? Analysis of soil, sediment, and sediment pore water and groundwater samples will be used to determine the degree of contamination on the site.
What type of data is needed? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques)
2010 sampling: Laboratory data for VOCs, SVOCs, metals and cyanide from samples collected from sub-surface soil, surface sediment, and groundwater using Contract Laboratory Program (CLP) Statement of Work (SOW).
2011 sampling: Laboratory data for PCBs and dioxin from surface soil and sediment, for VOCs and SVOCs from groundwater, for VOCs, SVOCs, TOC, Pb and grain size from sediment, and for VOCs, SVOCs and Pb from sediment pore water using CLP SOW and SERAS designated sub-contract laboratory (dioxin).
How “good” do the data need to be in order to support the environmental decision? Definitive data are required for the soil, sediment, sediment pore water and groundwater samples. Worksheet #12 and #28 indicate the measurement performance criteria that are needed for the quality indicators. Worksheet #20 outlines the field quality control (QC) sample requirements.
How much data are needed? (number of samples for each analytical group, matrix, and concentration)
2010 sampling: 10 Groundwater samples for VOCs, SVOCs, metals and cyanide 20 soil samples from ten borings (2 soil samples per boring) for: VOCs, SVOC, metals and cyanide 6 surface sediment samples for VOCs, SVOCs, and metals;
2011 sampling: 4 Groundwater samples including 1 duplicate for VOCs and SVOCs 12 Near-surface soil samples including 1 duplicate for PCBs and dioxin 2 Sediment samples for PCBs and dioxin 25 Sediment samples (22 from the river bordering the site including 2 duplicates. And up to 3 from the basement of the Building #7). The sediment samples from the river will be analyzed for VOCs, SVOCs, TOC, Pb and grain size, and the sediment samples from the basement will be analyzed for VOCs and SVOCs. 11 Sediment pore water samples (including 1 dup) from the Passaic River for VOCs, SVOCs and Pb.

Where, when, and how should the data be collected/generated?

2010 sampling:

Groundwater and soil samples were collected the week of 6/21/10 using methods consistent with direct-push boring techniques on the site. Surface sediment samples were collected manually the same week with a soil auger.

2011 sampling:

Well installation is scheduled to start on February 23, 2011 and field sampling will be completed in March 2011. Pressure transducers will be retrieved after recording through a full spring tide.

Groundwater sample will be collected from installed monitor wells.

Near –surface soil samples will be collected using stainless steel trowels.

Sediment samples will be collected using a corer method to the depths of 1.5-2.5 feet and 3.5-4.5 feet.

Sediment pore water will be collected from temporary piezometers to be installed in near-shore area of the Passaic River at the sediment depths of 3.5-4.5 feet from 10 locations. Refer to Figure 1A, Site Sampling Map.

Who will collect and generate the data?

SERAS field personnel will collect field samples and generate the data associated with the pressure transducers. CLP laboratory personnel and SERAS designated sub-contract laboratory personnel will conduct the sample analyses.

How will the data be reported?

Results generated by the CLP laboratory will be forwarded to the SERAS Task Leader by the WAM. Validated data for dioxin will be submitted to the SERAS Task Leader in an analytical report prepared in accordance with SERAS SOP #4020, *Analytical Report Preparation*. Electronic files compatible with Scribe will be generated by the CLP laboratory and by the SERAS QA/QC Group for dioxin. Analytical results from the samples will be plotted on a map of the site. A final trip report will be prepared in accordance with SERAS SOP #4017, *Preparation of Trip Reports*. The final trip report will be the final deliverable to the EPA/ERT WAM. Data will be disseminated to EPA Region 2 by the WAM.

How will the data be archived?

Analytical data for VOCs, SVOCs, Pb, TOC, and grain size will be retained by the CLP designated Laboratory. Data for dioxin will be archived by the SERAS QA/QC Group. Hard copies of all deliverables will be stored in SERAS Central Files. Electronic copies will be stored on SERAS Local Area Network (LAN). Data will be archived by SERAS in accordance with Administrative Procedure (AP) #34, *Archiving Electronic Files*.

QAPP Worksheet #12-1
Measurement Performance Criteria Table

Matrix	Aqueous				
Analytical Group	TCL Volatile Organics				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	SOM01.2	Precision (field)	±20% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank Trip Blank	S & A
				Method Blank	A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 33/Low/Medium VOA - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

QAPP Worksheet #12-2
Measurement Performance Criteria Table

Matrix	Aqueous				
Analytical Group	TCL Semivolatiles				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	SOM01.2	Precision (field)	±20% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
				Method Blank	A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 35/Low/Medium Semivolatile - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-3
Measurement Performance Criteria Table**

Matrix	Soil and Sediment (2011 sediment only)				
Analytical Group	TCL Volatiles				
Concentration Level	Low/Medium				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012 SERAS SOP #2016	SOM01.2	Precision (field)	±35% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Method Blank	A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 34/Trace VOA Trace VOA - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-4
Measurement Performance Criteria Table**

Matrix	Soil and Sediment (2011 sediment only)				
Analytical Group	TCL Semivolatiles				
Concentration Level	Low/Medium				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012 SERAS SOP #2016	SOM01.2	Precision (field)	±35% RPD	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Method Blank	A
		Precision (laboratory)	List compound specific RPD	MS/MSD**	A
		Accuracy (laboratory)	List compound specific %R	***DMCs; MS/MSD**	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 34/Trace VOA Trace VOA - Blank Type Criteria Table

****Optional** MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 6 for Criteria

***Deuterated Monitoring Compounds (DMCs) – Reference CLP SOM01.2, Exhibit D, Table 5 for Criteria

**QAPP Worksheet #12-5
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TAL Metals (2010 only)				
Concentration Level	ICP-AES				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	± 20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	≤ 20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%; 80–120 %	*** Matrix Spike; LCSW****	A A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Duplicate Sample Criteria - (include absolute difference criteria)

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria

****Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for aqueous Laboratory Control Sample (LCSW) Criteria w/exception of Ag and Sb

**QAPP Worksheet #12-6
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TAL –Total Mercury (2010 only)				
Concentration Level	Cold Vapor Atomic Absorption (CVAA)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	±20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	±20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%	*** Matrix Spike	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Duplicate Sample Criteria - - (include absolute difference criteria)

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Spike Sample Criteria

**QAPP Worksheet #12-7
Measurement Performance Criteria Table**

Matrix	Aqueous				
Analytical Group	TAL –Total Cyanide (2010 only)				
Concentration Level	Spectrophotometer				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2007	ILM05.4	Precision (field)	±20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Field Blank	S & A
		Precision (laboratory)	±20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%	*** Matrix Spike	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP- (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Duplicate Sample Criteria - (include absolute difference criteria)

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Spike Sample Criteria

QAPP Worksheet #12-8
Measurement Performance Criteria Table

Matrix	Soil and Sediment				
Analytical Group	TAL Metals (2011, Pb only)				
Concentration Level	ICP-AES				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012 SERAS SOP #2016	ILM05.4	Precision (field)	±35% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Method Blank	A
		Precision (laboratory)	± 35% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%	*** Matrix Spike; LCSS****	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Duplicate Sample Criteria

***Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria

****Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for solid Laboratory Control Sample (LCSS) **Note: Control Limits established by USEPA for LCSS**

QAPP Worksheet #12-9
Measurement Performance Criteria Table

Matrix	Soil and Sediment				
Analytical Group	TAL –Total Mercury (2010 only)				
Concentration Level	Cold Vapor Atomic Absorption (CVAA)				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012 SERAS SOP #2016	ILM05.4	Precision (field)	± 35% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	± 35% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125%;	*** Matrix Spike; LCSS****	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP – (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Duplicate Sample Criteria

Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria*Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for solid Laboratory Control Sample (LCSS) **Note: Control Limits established by USEPA for LCSS**

**QAPP Worksheet #12-10
Measurement Performance Criteria Table**

Matrix	Soil and Sediment				
Analytical Group	TAL –Total Cyanide (2010 only)				
Concentration Level	Spectrophotometer				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SERAS SOP #2012 SERAS SOP #2016	ILM05.4	Precision (field)	±20% RPD*	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL*	Rinsate Blank	S & A
		Precision (laboratory)	±20% RPD*	Duplicate Sample **	A
		Accuracy (laboratory)	75–125% Within limits established by EPA	*** Matrix Spike LCSS	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP- (include absolute difference criteria)

**Reference USEPA CLP ILM05.4, Exhibit D of ICP-MS for Duplicate Sample Criteria - (include absolute difference criteria)

Reference USEPA CLP ILM05.4, Exhibit D of ICP-AES for Spike Sample Criteria*Reference USEPA CLP ILM05.4, Exhibit D of CN for solid Laboratory Control Sample (LCSS) **Note: Control Limits established by USEPA for LCSS**

**QAPP Worksheet #12-11
Measurement Performance Criteria Table**

Matrix	Sediment				
Analytical Group	Total Organic Carbon (TOC)				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
Modified SERAS SOP #2016	USEPA Region 2 SOP C-88	Precision	RPD $\pm 40\%$	Field Duplicates	S & A
		Accuracy	Recovery 75-125%	Analytical Quality Control (AQC) Sample	A
		Precision	RPD $\pm 20\%$	AQC/AQC Duplicate	A
		Precision	RPD $\pm 50\%$	Sample Duplicates	A
		Sensitivity	<Reporting Limit (RL)	Method Detection Limits	A
		Accuracy/Bias	<RL	Equipment Blank	S & A
		Completeness	>90% sample collection >90% sample analysis	Data Completeness Check	S & A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

**QAPP Worksheet #12-12
Measurement Performance Criteria Table**

Matrix	Sediment				
Analytical Group	Grain Size				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP #2016	USEPA Region 2 SOP BIO-8.3	Precision	RPD \pm 20%	Lab Duplicate	A
		Completeness	>90% laboratory analysis	Data Completeness Check	A

¹Reference number from QAPP Worksheet #21 (see Section 3.1.2)

²Reference number from QAPP Worksheet #23 (see Section 3.2)

Worksheet #12-13
Measurement Performance Criteria Table

Matrix	Soil and Sediment				
Analytical Group	TCL Aroclors				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP #2012/2016	SOM01.2, Exhibit D, Aroclors	Precision (field)	±35%RPD	Field Duplicate	S & A
		Accuracy/Bias (Contamination)	< CRQL*	Method Blank	A
		Precision (laboratory)	Aroclor 1016: RPD 0-15 Aroclor 1260: RPD 0-20	MS/MSD**	A
		Accuracy/Bias (laboratory)	Aroclor 1016: %R 50-150 Aroclor 1260: %R 50-150	LCS***	A
			Aroclor 1016: %R 29-135 Aroclor 1260: %R 29-135	MS**	A
		Accuracy/Bias	%R = 30-150	Surrogates	A

¹Reference number from QAPP Worksheet #21

²Reference number from QAPP Worksheet #23

*Reference USEPA Region 2 SOP No. 36/Low/Medium Pesticide - Blank Type Criteria Table

**MS/MSD – Reference CLP SOM01.2, Exhibit D, Table 3 for Criteria

***Laboratory Control Sample (LCS) – Reference CLP SOM01.2, Exhibit D, Table 2 for Criteria

Worksheet #12-14
Measurement Performance Criteria Table

Matrix	Soil and Sediment				
Analytical Group	Dioxins				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP # 2012/2016	SW-846 Method 8290A	Accuracy/Bias	¹³ C ₁₂ -2378-TCDD – 40-135% ¹³ C ₁₂ -2378-TCDF – 40-135% ¹³ C ₁₂ -12378-PeCDD – 40-135% ¹³ C ₁₂ -12378-PeCDF – 40-135% ¹³ C ₁₂ -123678-HxCDD – 40-135% ¹³ C ₁₂ -123789-HxCDF – 40-135% ¹³ C ₁₂ -1234678-HpCDD – 40-135% ¹³ C ₁₂ -1234678-HpCDF – 40-135% ¹³ C ₁₂ -OCDD – 40-135%	Labeled Compounds	A
		Accuracy/Bias (Contamination)	<RL	Method Blank	A
		Precision	±35%RPD	Field Duplicate	S & A

Worksheet #12-14
Measurement Performance Criteria Table

Matrix	Soil and Sediment				
Analytical Group	Dioxins				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP # 2012/2016	SW-846 Method 8290A	Accuracy/Bias	2378-TCDD – 70-130% 2378-TCDF – 70-130% 12378-PeCDD – 70-130% 12378-PeCDF – 70-130% 23478-PeCDF – 70-130% 123478-HxCDD – 70-130% 123678-HxCDD – 70-130% 123789-HxCDD – 70-130% 123478-HxCDF – 70-130% 123678-HxCDF – 70-130% 123789-HxCDF – 70-130% 234678-HxCDF – 70-130% 1234678-HpCDD – 70-130% 1234678-HpCDF – 70-130% 1234789-HpCDF – 70-130% OCDD – 70-130% OCDF – 70-130%	LCS	A
		Precision	RPD ±20%	LCS/LCSD	A

Worksheet #12-14
Measurement Performance Criteria Table

Matrix	Soil and Sediment				
Analytical Group	Dioxins				
Concentration Level	Low				
Sampling Procedure¹	Analytical Method/SOP²	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
SERAS SOP # 2012/2016	SW-846 Method 8290A	Accuracy/Bias	2378-TCDD – 70-130% 2378-TCDF – 70-130% 12378-PeCDD – 70-130% 12378-PeCDF – 70-130% 23478-PeCDF – 70-130% 123478-HxCDD – 70-130% 123678-HxCDD – 70-130% 123789-HxCDD – 70-130% 123478-HxCDF – 70-130% 123678-HxCDF – 70-130% 123789-HxCDF – 70-130% 234678-HxCDF – 70-130% 1234678-HpCDD – 70-130% 1234678-HpCDF – 70-130% 1234789-HpCDF – 70-130% OCDD – 70-130% OCDF – 70-130%	MS	A
		Precision	RPD ±20%	MS/MSD	A
		Accuracy/Bias	¹³ C ₁₂ - 1234-TCDD - 50-200% ¹³ C ₁₂ - 123789-HxCDD - 50-200%	Recovery Standards	A

QAPP Worksheet #13
Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data Will Be Used	Limitations on Data Use
Site Investigation	Birdsall Services Group Inc./ PMK Group, Inc. Draft Site Investigation 1700-1712 and 1702-1716 McCarter Highway October 2009	Birdsall Services Group Inc./ PMK Group, Inc. Laboratory analysis. Historical records, Geophysical survey	Used for site background information	More sampling needed to fill data gaps.

QAPP Worksheet #14

Summary of Project Tasks

Sampling Tasks:

2010 Sampling

Groundwater was sampled from temporary piezometers in accordance with SERAS SOP #2007, *Groundwater Well Sampling*. Soil samples were collected from borings advanced with direct-push methods in accordance with SERAS SOP #2012, *Soil Sampling*. Surface sediment samples were collected from the Passaic River in accordance with SERAS SOP #2017, *Sediment Sampling*.

2011 Sampling

Groundwater samples will be collected from permanent groundwater monitor wells to be installed on the site in 2011. Sediment pore water samples will be collected from temporary piezometers installed in the Passaic River. Soil samples will be collected from the surface (0-3 inches). Sediment samples will be collected at depths of 1.5-2.5 feet and 3.5-4.5 feet from sediment cores to be collected from the Passaic River. Sediment samples at depths of 0-2 feet will also be collected from the sub-basement of Building #7. Refer to Worksheet #18 for sampling locations, matrix, depth, analytes and sampling methodology.

Analysis Tasks:

All samples will be analyzed per the details in Worksheet 19, Analytical SOP Requirements.

Quality Control Tasks:

Refer to Worksheet #20 for field QC Samples and Worksheets #12 and #28 for analytical QC samples based on CLP and SW-846 methodologies.

Secondary Data: Used for site background information

Data Management Tasks:

All sampling locations will be identified by a field assigned number. Field sampling data will be recorded on field data sheets or in field logbooks. All field samples will be delivered under chain of custody (COC) to a CLP Laboratory and a SERAS designated sub-contract laboratory. Laboratory procedures will be reviewed and the data verified for the appropriate quality assurance objectives. All deliverables will be generated in accordance to the appropriate SERAS SOP and posted to the ERT- Information Management System (IMS) website upon completion. Posting to the ERT-IMS site will be considered as completion of the deliverable.

Documentation and Records:

All documentation will be recorded in accordance with SERAS SOP #4001, *Logbook Documentation* and SOP #2002, *Sample Documentation*. The trip report will provide a description of the project; field and laboratory methodologies and results, and will be prepared in accordance with SERAS SOP #4017, *Preparation of Trip Reports*. Documents and records that may be generated during this project include: WP, amended WP, QAPP, amended QAPP, HASP, Field and Laboratory Logbooks, Site Map, Sample Labels, COC Records, Custody Seals, Projected Work Assignments (PWA), Data Review Records, Data Reduction Records, Data Validation Records, Data Assessment Forms, Instrument Printouts, Analytical Results, Scribe Database, Analytical Report (for dioxin), Trip Report, and Field Change Forms, if necessary.

Assessment/Audit Tasks:

No performance audit of field operations is anticipated for this project. The tasks associated with this QAPP are assessed using peer reviews and management system reviews. Peer review enables the field team to identify and correct reporting errors before reports are submitted. Management system reviews establish compliance with prevailing management structure, policies and procedures, and ensures that the required data are obtained.

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Data Review Tasks:

Analytical data deliverables for CLP laboratories will be in accordance with the U.S. EPA CLP *SOW for Organic Analysis Multi-Media, Multi-Concentration [SOM0 1.2]*, and U.S. EPA CLP *SOW for Multi-Media, Multi-Concentration Inorganic Analysis [ILM0 5.4]*. Organic data will be validated in accordance with SOP Number *HW-33/Data Validation SOP for Organic Analysis of Low/Medium Concentration of VOCs under SOM01.2* and SOP Number *HW-35/Data Validation SOP for Organic Analysis of Low/Medium Concentration of SVOCs under SOM01.1, Revision 1*. The inorganic data will be validated according to SOP Number *HW-2 Validation of Metals for the Contract Laboratory Program (CLP) based on SOW ILM05.3 (SOP Revision 13)*. Dioxin data will be validated in accordance with SERAS SOP #1019, *Data Validation Procedures for Dioxin/Furan Analysis by HRGC/HRMS*. All SERAS project deliverables will receive an internal peer review prior to release, per guidelines established in the SERAS AP #22, *Peer Review of SERAS Deliverables*.

QAPP Worksheet #15-1 Reference Limits and Evaluation Table

Matrix: Soil and Sediment
Analytical Group: Target Compound List Volatile Organic Compounds
Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Dichlorodifluoromethane	75-71-8	NS	NS	0.005	0.005	0.25
Chloromethane	74-87-3	1000	10	0.005	0.005	0.25
Vinyl Chloride	75-01-4	7.0	10	0.005	0.005	0.25
Bromomethane	74-83-9	1000	1.0	0.005	0.005	0.25
Chloroethane	75-00-3	NS	NS	0.005	0.005	0.25
Trichlorofluoromethane	75-69-4	NS	NS	0.005	0.005	0.25
1,1-Dichloroethene	75-35-4	150	10	0.005	0.005	0.25
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	NS	0.005	0.005	0.25
Acetone	67-64-1	1000	100	0.010	0.010	0.50
Carbon Disulfide	75-15-0	NS	NS	0.005	0.005	0.25
Methyl Acetate	79-20-9	NS	NS	0.005	0.005	0.25
Methylene Chloride	75-09-2	210	1.0	0.005	0.005	0.25
trans-1,2-Dichloroethene	156-60-5	1000	50	0.005	0.005	0.25
Methyl tert-Butyl Ether	1634-04-4	NS	NS	0.005	0.005	0.25
1,1-Dichloroethane	75-34-3	1000	10	0.005	0.005	0.25
cis-1,2-Dichloroethene	156-59-2	1000	1.0	0.005	0.005	0.25
2-Butanone	78-93-3	1000	50	0.010	0.010	0.50
Chloroform	67-66-3	28	1.0	0.005	0.005	0.25
1,1,1-Trichloroethane	71-55-6	1000	50	0.005	0.005	0.25
Cyclohexane	110-82-7	NS	NS	0.005	0.005	0.25
Carbon Tetrachloride	56-23-5	4.0	1.0	0.005	0.005	0.25
Benzene	71-43-2	13	1.0	0.005	0.005	0.25
1,2-Dichloroethane	107-06-2	24	1.0	0.005	0.005	0.25
Trichloroethene	79-01-6	54	1.0	0.005	0.005	0.25
Methylcyclohexane	108-87-2	NS	NS	0.005	0.005	0.25
1,2-Dichloropropane	78-87-5	43	NS	0.005	0.005	0.25
Bromodichloromethane	75-27-4	46	1.0	0.005	0.005	0.25
cis-1,3-Dichloropropene	10061-01-5	5.0	1.0	0.005	0.005	0.25
4-Methyl-2-Pentanone	108-10-1	1000	50	0.010	0.010	0.50

For detailed references, see Footnotes below.

QAPP Worksheet #15-1 Reference Limits and Evaluation Table

Matrix: Soil and Sediment

Analytical Group: Target Compound List Volatile Organic Compounds - Continued

Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Toluene	108-88-3	1000	500	0.005	0.005	0.25
trans-1,3-Dichloropropene	10061-02-6	5.0	1.0	0.005	0.005	0.25
1,1,2-Trichloroethane	79-00-5	420	1.0	0.005	0.005	0.25
Tetrachloroethene	127-18-4	6.0	1.0	0.005	0.005	0.25
2-Hexanone	591-78-6	NS	NS	0.010	0.010	0.50
Dibromochloromethane	124-48-1	1000	1.0	0.005	0.005	0.25
1,2-Dibromoethane	106-93-4	NS	NS	0.005	0.005	0.25
Chlorobenzene	108-90-7	680	1.0	0.005	0.005	0.25
Ethylbenzene	100-41-4	1000	100	0.005	0.005	0.25
Xylenes (total)	1330-20-7	1000	67	0.005	0.005	0.25
Styrene	100-42-5	97	100	0.005	0.005	0.25
Bromoform	75-25-2	370	1.0	0.005	0.005	0.25
Isopropylbenzene	98-82-8	NS	NS	0.005	0.005	0.25
1,1,2,2-Tetrachloroethane	79-34-5	70	1.0	0.005	0.005	0.25
1,3-Dichlorobenzene	541-73-1	10,000	100	0.005	0.005	0.25
1,4-Dichlorobenzene	106-46-7	10,000	100	0.005	0.005	0.25
1,2-Dichlorobenzene	95-50-1	10,000	50	0.005	0.005	0.25
1,2-Dibromo-3-chloropropane	96-12-8	NS	NS	0.005	0.005	0.25
1,2,4-Trichlorobenzene	120-82-1	1200	100	0.005	0.005	0.25

*New Jersey Department of Environmental Protection (NJDEP) - Direct Contact Soil Cleanup Criteria, May 12, 1999.

NS = Not Specified

QAPP Worksheet #15-2

Reference Limits and Evaluation Table

Matrix: Soil and Sediment
Analytical Group: Target Compound List – Semi-Volatile Organic Compounds
Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
1,1'-Biphenyl	92-52-4	NS	NS	0.17	0.17	5.0
2,2'-oxybis(1-Chloropropane)	108-60-1	NS	NS	0.17	0.17	5.0
2,4,5-Trichlorophenol	95-95-4	10,000	50	0.17	0.17	5.0
2,4,6-Trichlorophenol	88-06-2	270	10	0.17	0.17	5.0
2,4-Dichlorophenol	120-83-2	3100	10	0.17	0.17	5.0
2,4-Dimethylphenol	105-67-9	10,000	10	0.17	0.17	5.0
2,4-Dinitrophenol	51-28-5	2100	10	0.33	0.33	10
2,4-Dinitrotoluene	121-14-2	4	10	0.17	0.17	5.0
2,6-Dinitrotoluene	606-20-2	4	10	0.17	0.17	5.0
2-Chloronaphthalene	91-58-7	NS	NS	0.17	0.17	5.0
2-Chlorophenol	95-57-8	5200	10	0.17	0.17	5.0
2-Methylnaphthalene	91-57-6	NS	NS	0.17	0.17	5.0
2-Methylphenol (o-cresol)	95-48-7	10000	NS	0.17	0.17	5.0
2-Nitroaniline	88-74-4	NS	NS	0.33	0.33	10
2-Nitrophenol	88-75-5	NS	NS	0.17	0.17	5.0
3,3'-Dichlorobenzidine	91-94-1	6	100	0.17	0.17	5.0
3-Nitroaniline	99-09-2	NS	NS	0.33	0.33	10
4,6-Dinitro-2-methylphenol	534-52-1	NS	NS	0.33	0.33	10
4-Bromophenyl-phenylether	101-55-3	NS	NS	0.17	0.17	5.0
4-Chloro-3-methylphenol	59-50-7	10,000	100	0.17	0.17	5.0
4-Chloroaniline	106-47-8	4200	NS	0.17	0.17	5.0
4-Chlorophenyl-phenyl ether	7005-72-3	NS	NS	0.17	0.17	5.0
4-Methylphenol (p-cresol)	106-44-5	10,000	NS	0.17	0.17	5.0
4-Nitroaniline	100-01-6	NS	NS	0.33	0.33	10
4-Nitrophenol	100-02-7	NS	NS	0.33	0.33	10
Acenaphthene	83-32-9	10,000	100	0.17	0.17	5.0
Acenaphthylene	208-96-8	NS	NS	0.17	0.17	5.0
Acetophenone	98-86-2	NS	NS	0.17	0.17	5.0
Anthracene	120-12-7	10,000	100	0.17	0.17	5.0

*For detailed references, see Footnotes below.

QAPP Worksheet #15-2 Reference Limits and Evaluation Table

Matrix: Soil and Sediment

Analytical Group: Target Compound List – Semi-Volatile Organic Compounds - Continued

Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Atrazine	1912-24-9	NS	NS	0.17	0.17	5.0
Benzaldehyde	100-52-7	NS	NS	0.17	0.17	5.0
Benzo(a)anthracene	56-55-3	4	500	0.17	0.17	5.0
Benzo(a)pyrene	50-32-8	0.66	100	0.17	0.17	5.0
Benzo(b)fluoranthene	205-99-2	4	50	0.17	0.17	5.0
Benzo(g,h,i)perylene	191-24-2	NS	NS	0.17	0.17	5.0
Benzo(k)fluoranthene	207-08-9	4	500	0.17	0.17	5.0
Bis(2-Chloroethoxy)methane	111-91-1	NS	NS	0.17	0.17	5.0
Bis-(2-Chloroethyl) ether	111-44-4	3	10	0.17	0.17	5.0
bis(2-Ethylhexyl)phthalate	117-81-7	210	100	0.17	0.17	5.0
Butylbenzylphthalate	85-68-7	10,000	100	0.17	0.17	5.0
Caprolactam	105-60-2	NS	NS	0.17	0.17	5.0
Carbazole	86-74-8	NS	NS	0.17	0.17	5.0
Chrysene	218-01-9	40	500	0.17	0.17	5.0
Dibenzo(a,h)anthracene	53-70-3	0.66	100	0.17	0.17	5.0
Dibenzofuran	132-64-9	NS	NS	0.17	0.17	5.0
Diethylphthalate	84-66-2	10,000	50	0.17	0.17	5.0
Dimethylphthalate	131-11-3	10,000	50	0.17	0.17	5.0
Di-n-butylphthalate	84-74-2	10,000	100	0.17	0.17	5.0
Di-n-octylphthalate	117-84-0	10,000	100	0.17	0.17	5.0
Fluoranthene	206-44-0	10,000	100	0.17	0.17	5.0
Fluorene	86-73-7	10,000	100	0.17	0.17	5.0
Hexachlorobenzene	118-74-1	2	100	0.17	0.17	5.0
Hexachlorobutadiene	87-68-3	21	100	0.17	0.17	5.0
Hexachlorocyclopentadiene	77-47-4	7300	100	0.17	0.17	5.0
Hexachloroethane	67-72-1	100	100	0.17	0.17	5.0
Indeno(1,2,3-cd)pyrene	193-39-5	4	500	0.17	0.17	5.0

*For detailed references, see Footnotes below.

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Soil and Sediment

Analytical Group: Target Compound List – Semi-Volatile Organic Compounds - Continued

Concentration Level: Low and Medium

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*		Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 (Low) Quantitation Limits (mg/kg)	Analytical Method – SOM01.2 (Medium) Quantitation Limits (mg/kg)
		Non-Residential	Impact to GW			
Isophorone	78-59-1	10,000	50	0.17	0.17	5.0
Naphthalene	91-20-3	4200	100	0.17	0.17	5.0
Nitrobenzene	98-95-3	520	10	0.17	0.17	5.0
N-Nitrosodiphenylamine	86-30-6	600	100	0.17	0.17	5.0
N-Nitroso-di-n-propylamine	621-64-7	0.66	10	0.17	0.17	5.0
Pentachlorophenol	87-86-5	24	100	0.33	0.33	10
Phenanthrene	85-01-8	NS	NS	0.17	0.17	5.0
Phenol	108-95-2	10,000	50	0.17	0.17	5.0
Pyrene	129-00-0	10,000	100	0.17	0.17	5.0

*New Jersey Department of Environmental Protection (NJDEP) - Direct Contact Soil Cleanup Criteria, May 12, 1999.

NS = Not Specified.

QAPP Worksheet #15-3 Reference Limits and Evaluation Table

Matrix: Soil and Sediment (2011 sediment only)
Analytical Group: Target Analyte List Inorganics (Mercury and Cyanide)
 (2011 Pb only)
Concentration Level: Low

Analyte	CAS Number	NJDEP Soil Cleanup Criteria (mg/kg)*	Project Quantitation Limit (mg/kg)	Analytical Method – SOM01.2 Quantitation Limits (mg/kg)
		Non-Residential		
Aluminum	7429-90-5	NS	20	20
Antimony	7440-36-0	340	6	6
Arsenic	7440-38-2	20	1	1
Barium	7440-39-3	47,000	20	20
Beryllium	7440-41-7	2	0.5	0.5
Cadmium	7440-43-9	100	0.5	0.5
Calcium	7440-70-2	NS	500	500
Chromium	7440-47-3	NS	1	1
Cobalt	7440-48-4	NS	5	5
Copper	7440-50-8	600	2.5	2.5
Iron	7439-89-6	NS	10	10
Lead	7439-92-1	600	1	1
Magnesium	7439-95-4	NS	500	500
Manganese	7439-96-5	NS	1.5	1.5
Mercury	7439-97-6	270	0.1	0.1
Nickel	7440-02-0	2400	4	4
Potassium	7440-09-7	NS	500	500
Selenium	7782-49-2	3100	3.5	3.5
Silver	7440-22-4	4100	1	1
Sodium	7440-23-5	NS	500	500
Thallium	7440-28-0	2	2.5	2.5
Vanadium	7440-62-2	7100	5	5
Zinc	7440-66-6	1500	6	6
Cyanide	57-12-5	21,000	2.5	2.5

*New Jersey Department of Environmental Protection (NJDEP) - Direct Contact Soil Cleanup Criteria, May 12, 1999.

NS = Not Specified.

QAPP Worksheet #15-4 Reference Limits and Evaluation Table

Matrix: Groundwater and Sediment Pore Water
Analytical Group: Target Compound List Volatile Organic Compounds
Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards* (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
Dichlorodifluoromethane	75-71-8	1000	5	5
Chloromethane (Methyl Chloride)	74-87-3	NS	5	5
Vinyl Chloride	75-01-4	1	5	5
Bromomethane	74-83-9	10	5	5
Chloroethane	75-00-3	NS	5	5
Trichlorofluoromethane	75-69-4	2000	5	5
1,1-Dichloroethene	75-35-4	1	5	5
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	NS	5	5
Acetone (2-Propanone)	67-64-1	6000	10	10
Carbon Disulfide	75-15-0	700	5	5
Methyl Acetate	79-20-9	7000	5	5
Methylene Chloride	75-09-2	3.0	5	5
trans-1,2-Dichloroethene	156-60-5	100	5	5
Methyl tert-Butyl Ether	1634-04-4	70	5	5
1,1-Dichloroethane	75-34-3	50	5	5
cis-1,2-Dichloroethene	156-59-2	70	5	5
2-Butanone (Methyl Ethyl Ketone)	78-93-3	300	10	10
Bromochloromethane	74-97-5	NS	5	5
Chloroform	67-66-3	70	5	5
1,1,1-Trichloroethane	71-55-6	30	5	5
Cyclohexane	110-82-7	NS	5	5
Carbon Tetrachloride	56-23-5	1	5	5
Benzene	71-43-2	1	5	5
1,2-Dichloroethane	107-06-2	2	5	5
Trichloroethene	79-01-6	1	5	5
Methylcyclohexane	108-87-2	NS	5	5
1,2-Dichloropropane	78-87-5	1	5	5
Bromodichloromethane	75-27-4	1	5	5
cis-1,3-Dichloropropene	10061-01-5	1	5	5

QAPP Worksheet #15-4 Reference Limits and Evaluation Table

Matrix: Groundwater and Sediment Pore Water
Analytical Group: Target Compound List Volatile Organic Compounds – Continued
Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards* (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Low Quantitation Limits (ug/L)
4-Methyl-2-Pentanone	108-10-1	NS	10	10
Toluene	108-88-3	600	5	5
trans-1,3-Dichloropropene	10061-02-6	1	5	5
1,1,2-Trichloroethane	79-00-5	3	5	5
Tetrachloroethene	127-18-4	1	5	5
2-Hexanone	591-78-6	NS	10	10
Dibromochloromethane	124-48-1	1	5	5
1,2-Dibromoethane	106-93-4	NS	5	5
Chlorobenzene	108-90-7	50	5	5
Ethylbenzene	100-41-4	700	5	5
Xylenes (total)	1330-20-7	1000	5	5
Styrene	100-42-5	100	5	5
Bromoform	75-25-2	4	5	5
Isopropylbenzene	98-82-8	NS	5	5
1,1,2,2-Tetrachloroethane	79-34-5	1	5	5
1,3-Dichlorobenzene	541-73-1	600	5	5
1,4-Dichlorobenzene	106-46-7	75	5	5
1,2-Dichlorobenzene	95-50-1	600	5	5
1,2-Dibromo-3-chloropropane	96-12-8	0.02	5	5
1,2,4-Trichlorobenzene	120-82-1	9	5	5
1,2,3-Trichlorobenzene	87-61-6	NS	5	5

*NJDEP N.J.A.C. 7:9C, Ground Water Quality Standards (GWQS) dated November 7, 2005.

For a compound that has a Project Quantitation Limit (PQL) above the NJAC Groundwater Quality Standards, the data for that compound will not be considered for the removal assessment if the reported concentration of the compound in a sample is below the PQL.

NS = Not Specified

QAPP Worksheet #15-5 Reference Limits and Evaluation Table

Matrix: Groundwater and Sediment Pore Water
Analytical Group: Target Compound List - Semi-Volatile Organic Compounds
Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards* (ug/L)	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
1,1'-Biphenyl	92-52-4	400	5	5
1,2,4,5 Tetrachlorobenzene	95-94-3	NS	5	5
2,2'-oxybis(1-Chloropropane)	108-60-1	NS	5	5
2,4,5-Trichlorophenol	95-95-4	700	5	5
2,4,6-Trichlorophenol	88-06-2	20	5	5
2,4-Dichlorophenol	120-83-2	20	5	5
2,4-Dimethylphenol	105-67-9	100	5	5
2,4-Dinitrophenol	51-28-5	40	10	10
2,4-Dinitrotoluene	121-14-2	10	5	5
2,6-Dinitrotoluene	606-20-2	10	5	5
2-Chloronaphthalene	91-58-7	6000	5	5
2-Chlorophenol	95-57-8	40	5	5
2-Methylnaphthalene	91-57-6	NS	5	5
2-Methylphenol	95-48-7	NS	5	5
2-Nitroaniline	88-74-4	NS	10	10
2-Nitrophenol	88-75-5	NS	5	5
3,3'-Dichlorobenzidine	91-94-1	30	5	5
3-Nitroaniline	99-09-2	NS	10	10
4,6-Dinitro-2-methylphenol	534-52-1	NS	10	10
4-Bromophenyl-phenylether	101-55-3	NS	5	5
4-Chloro-3-methylphenol	59-50-7	NS	5	5
4-Chloroaniline	106-47-8	30	5	5
4-Chlorophenyl-phenyl ether	7005-72-3	NS	5	5
4-Methylphenol	106-44-5	NS	5	5
4-Nitroaniline	100-01-6	NS	10	10
4-Nitrophenol	100-02-7	NS	10	10
Acenaphthene	83-32-9	400	5	5
Acenaphthylene	208-96-8	NS	5	5
Acetophenone	98-86-2	700	5	5
Anthracene	120-12-7	2000	5	5
Atrazine	1912-24-9	3	5	5
Benzaldehyde	100-52-7	NS	5	5
Benzo(a)anthracene	56-55-3	0.1	5	5
Benzo(a)pyrene	50-32-8	0.1	5	5

QAPP Worksheet #15-5 Reference Limits and Evaluation Table

Matrix: Groundwater and Sediment Pore Water

Analytical Group: Target Compound List - Semi-Volatile Organic Compounds - Continued

Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – SOM01.2 Quantitation Limits (ug/L)
Benzo(b)fluoranthene	205-99-2	0.2	5	5
Benzo(g,h,i)perylene	191-24-2	NS	5	5
Benzo(k)fluoranthene	207-08-9	0.5	5	5
Bis(2-Chloroethoxy)methane	111-91-1	NS	5	5
Bis-(2-Chloroethyl) ether	111-44-4	7	5	5
bis(2-Ethylhexyl)phthalate	117-81-7	3	5	5
Butylbenzylphthalate	85-68-7	100	5	5
Caprolactam	105-60-2	NS	5	5
Chrysene	218-01-9	5	5	5
Dibenzo(a,h)anthracene	53-70-3	0.3	5	5
Dibenzofuran	132-64-9	NS	5	5
Diethylphthalate	84-66-2	6000	5	5
Dimethylphthalate	131-11-3	NS	5	5
Di-n-butylphthalate	84-74-2	700	5	5
Di-n-octylphthalate	117-84-0	100	5	5
Fluoranthene	206-44-0	300	5	5
Fluorene	86-73-7	300	5	5
Hexachlorobenzene	118-74-1	0.02	5	5
Hexachlorobutadiene	87-68-3	1	5	5
Hexachlorocyclopentadiene	77-47-4	40	5	5
Hexachloroethane	67-72-1	7	5	5
Indeno(1,2,3-cd)pyrene	193-39-5	0.2	5	5
Isophorone	78-59-1	40	5	5
Naphthalene	91-20-3	NS	5	5
Nitrobenzene	98-95-3	300	5	5
N-Nitrosodiphenylamine	86-30-6	10	5	5
N-Nitroso-di-n-propylamine	621-64-7	10	5	5
Pentachlorophenol	87-86-5	0.3	10	10
Phenanthrene	85-01-8	NS	5	5
Phenol	108-95-2	2000	5	5
Pyrene	129-00-0	200	5	5

*NJDEP N.J.A.C. 7:9C, Ground Water Quality Standards (GWQS) dated November 7, 2005. NS = Not Specified

For a compound that has a Project Quantitation Limit (PQL) above the NJAC Groundwater Quality Standards, the data for that compound will not be considered if the concentration of the compound in a sample is below the PQL.

QAPP Worksheet #15-6 Reference Limits and Evaluation Table

Matrix: Groundwater and Sediment Pore Water

Analytical Group: Target Compound List - Metals

Concentration Level: Low

Analyte	CAS Number	NJAC Groundwater Quality Standards (ug/L)*	Project Quantitation Limit (ug/L)	Analytical Method – ILMO5.4 ICP-AES Quantitation Limits (ug/L)
Aluminum	7429-90-5	200	200	200
Antimony	7440-36-0	6	60	60
Arsenic	7440-38-2	3	10	10
Barium	7440-39-3	6000	200	200
Beryllium	7440-41-7	1	5	5
Cadmium	7440-43-9	4	5	5
Calcium	7440-70-2	NS	5000	5000
Chromium	7440-47-3	70	10	10
Cobalt	7440-48-4	NS	50	50
Copper	7440-50-8	1300	25	25
Iron	7439-89-6	300	100	100
Lead	7439-92-1	5	10	10
Magnesium	7439-95-4	NS	5000	5000
Manganese	7439-96-5	50	15	15
Mercury	7439-97-6	2	0.2	0.2
Nickel	7440-02-0	100	40	40
Potassium	2023695	NS	5000	5000
Selenium	7782-49-2	40	35	35
Silver	7440-22-4	40	10	10
Sodium	7440-23-5	50000	5000	5000
Thallium	7440-28-0	2	25	25
Vanadium	7440-62-2	NS	50	50
Zinc	7440-66-6	2000	60	60
Cyanide	57-12-5	100	10	10

*NJDEP N.J.A.C. 7:9C, Ground Water Quality Standards (GWQS) dated November 7, 2005.

For a compound that has a Project Quantitation Limit (PQL) above the NJAC Groundwater Quality Standards, the data for that compound will not be considered if the concentration of the compound in a sample is below the PQL.

NS = Not Specified

QAPP Worksheet #15-7
Reference Limits and Evaluation Table

Matrix:	Sediment						
Analytical Group:	Total Organic Carbon						
Concentration Level:	Low						
Analyte	CAS Number	Project Action Limit (mg/kg)	Project Quantitation Limit (mg/kg)	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs (mg/kg)	MDLs (mg/kg)	QLs (mg/kg)
TOC	NA	NA	100	Not listed	100	0.19	100

NS = not specified

NA = not applicable

QAPP Worksheet #15-8 Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: TCL Aroclors

Concentration Level: Low

Analyte	CAS Number	Project Action Limit** (µg/kg)	Project Quantitation Limit (µg/kg)	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs (µg/kg)	MDLs	QLs (µg/kg)
Total PCBs	1336-36-3	2,000	33.0	NS	33.0	lab specific	33.0
Aroclor-1016	12674-11-2	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1221	11104-28-2	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1232	11141-16-5	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1242	53469-21-9	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1248	12672-29-6	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1254	11097-69-1	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1260	11096-82-5	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1262	37324-23-5	NS	33.0	NS	33.0	lab specific	33.0
Aroclor-1268	11100-14-4	NS	33.0	NS	33.0	lab specific	33.0

**Project Action limits: Based on New Jersey NJAC 7:26D Remediation Standards for Total PCBs Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC).

NS = Not Specified.

QAPP Worksheet #15-9 Reference Limits and Evaluation Table

Matrix: Soil

Analytical Group: Dioxins

Concentration Level: Low

Analyte	CAS Number	Project Action Limit** (ng/kg)	Project Quantitation Limit (ng/kg)	Analytical Method		Achievable Laboratory Limits	
				MDLs	Method QLs (ng/kg)	MDLs (ng/kg) ¹	QLs (ng/kg)
2378 - TCDD	1746-01-6	NS	1.0	NA	1.0	0.0538	1.0
12378 - PeCDD	40321-76-4	NS	5.0	NA	5.0	0.103	5.0
123678-HxCDD	57653-85-7	NS	5.0	NA	5.0	0.175	5.0
123478-HxCDD	39227-28-6	NS	5.0	NA	5.0	0.183	5.0
123789-HxCDD	19408-74-3	NS	5.0	NA	5.0	0.151	5.0
1234678 - HpCDD	35822-46-9	NS	5.0	NA	5.0	0.118	5.0
OCDD	3268-87-9	NS	10	NA	10	0.286	10
2378-TCDF	51207-31-9	NS	1.0	NA	1.0	0.111	1.0
12378-PeCDF	57117-41-6	NS	5.0	NA	5.0	0.200	5.0
23478-PeCDF	57117-31-4	NS	5.0	NA	5.0	0.228	5.0
123678-HxCDF	57117-44-9	NS	5.0	NA	5.0	0.123	5.0
123789-HxCDF	72918-21-9	NS	5.0	NA	5.0	0.136	5.0
123478-HxCDF	70648-26-9	NS	5.0	NA	5.0	0.0736	5.0
234678-HxCDF	60851-34-5	NS	5.0	NA	5.0	0.0982	5.0
1234678-HpCDF	67562-39-4	NS	5.0	NA	5.0	0.215	5.0
1234789-HpCDF	55673-89-7	NS	5.0	NA	5.0	0.155	5.0
OCDF	39001-02-0	NS	10	NA	10	0.441	10

¹Based on 2009 MDL 8290 Study from Cape Fear Analytical

NS = not specified, NA = not applicable

** = To be determined by TL & WAM

**QAPP Worksheet #16
Project Schedule Timeline Table**

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Document review	SERAS	May 14, 2010	August 25, 2010	No	Not applicable
Soil and groundwater sampling, 2010	SERAS	June 23, 2010	June 25, 2010	No	Not applicable
Groundwater Monitor Well Installation	SERAS	February 23, 2011	February 25, 2011	No	Not applicable
Soil, groundwater, sediment, sediment pore water sampling, 2011	SERAS	Mid March 2011	Late March 2011	No	Not applicable
Laboratory Analysis, 2010	CLP laboratory	June 25, 2010	July 26, 2010	Yes	July 26, 2010
Laboratory Analysis, 2011	CLP laboratory	March 2011	April 2011	No	March 25, 2011
Laboratory Analysis, 2011 (Dioxin)	Cape Fear Analytical	March 2011	April 2011	Yes	Two weeks after receipt of laboratory data package
Trip Report 2010	SERAS	July 26, 2010	August 26, 2010	Yes	August 26, 2010
Trip Report 2011	SERAS	March 25, 2011	April 25, 2011	Yes	April 25, 2011

QAPP Worksheet #17 Sampling Design and Rationale

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

The sampling is to determine whether contamination from the site is flowing toward and impacting the Passaic River. Samples will be collected from upgradient locations and along the river to determine what contaminants are from the site and are entering the river. Samples will also be collected immediately downgradient of potential sources on the site (above ground and underground storage tanks).

2010 Sampling:

Grab samples were collected first for VOCs in soil from the cores. The remainder of the core was homogenized and then aliquots taken for the SVOC, metals and cyanide analyses. Grab samples were collected for the ground water samples. Sediment samples were collected from surface sediment (0-12 inches) for VOCs, SVOCs and metal analysis.

2011 Sampling:

Grab samples from near-surface soil (0-3 inches) will be collected from 11 locations at the site for PCBs and dioxin analysis.

Sediment samples will be collected from 2 locations at the sub-basement within the Building #7 at depths of 0-2 feet. The sediment samples will be analyzed for VOCs and SVOCs.

Sediment samples will also be collected from 10 locations along the Passaic River adjacent to the site. For each sampling location, the depths of sediment sampling will be 1.5-2.5 feet and 3.5-4.5 feet. The sediment samples will be analyzed for VOCs, SVOCs, TOC, Pb and grain size.

Sediment pore water samples will be collected at sediment depths of 3.5-4.5 feet from the 10 sampling locations where sediment samples are collected from the Passaic River. Sediment pore water samples will be analyzed for VOCs, SVOCs and lead.

Groundwater samples will be collected from three permanent groundwater monitor wells to be installed in 2011, and the water samples will be analyzed for VOCs and SVOCs.

Pressure transducers/data loggers will be temporarily installed in groundwater monitor wells, the site building basement, and the Passaic River. The groundwater elevation data will be collected for one week spanning a spring tide to evaluate groundwater discharge to the river over several tidal cycles including a spring tide.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations) [May refer to map or Worksheet #18 for details]:

Soil, groundwater, sediment, and sediment pore water samples will be collected and analyzed for VOCs, SVOCs, metals, and TOC (sediment only) at low or medium concentration levels; duplicates of all matrices and additional material will be collected for MS/MSD analysis. Trip blanks and field blanks will be collected for water matrices. A rinsate blank was collected from the cutting shoe after it has been decontaminated and from unused aluminum pans/spoons and gloves in 2010 sampling. For 2011 sampling, dedicated sampling equipment will be used and there will be no rinsate blank samples.

Up to 20 soil samples and 10 groundwater samples (not including QC) were collected during the week of 6/21/10.

Up to 11 surface soil samples, 22 sediment samples (2 from building basement, 20 from the river), 10 sediment pore water samples, and 3 groundwater samples will be collected in mid to late March 2011. The QC samples are not included in the number of samples to be collected.

The approximate locations of the sampling are shown on Figure 1A – Site Sampling Map.

QAPP Worksheet #18-1
Sampling Locations and Methods/SOP Requirements Table (2010 Sampling)

Sampling Location/ID Number	Matrix	Depth (Feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference ¹	Rationale for Sampling Location
B1_1	Soil	2.1-2.6	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and southwest corner of the site
B1_2	Soil	8.5-10.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and southwest corner of the site
B2_1	Soil	7.5-10.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and northwest corner of the site
B2_2	Soil	10.0-12.5	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Upgradient and northwest corner of the site
B3_1	Soil	5.0-7.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of above ground storage tanks
B3_2	Soil	7.0-9.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of above ground storage tanks
B4_1	Soil	2.5-4.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B4_2, B4_2dup	Soil	8.0-10.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B5_1	Soil	1.0-4.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B5_2	Soil	9.0-11.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of underground storage tanks
B6_1	Soil	1.0-2.5	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B6_2	Soil	5.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B7_1	Soil	8.5-9.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B7_2	Soil	10.0-10.5	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Downgradient of potential underground pipes
B8_1	Soil	5.0-5.5	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river southeast corner of the site

Sampling Location/ID Number	Matrix	Depth (Feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference ¹	Rationale for Sampling Location
B8_2	Soil	10.0-11.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river southeast corner of the site
B9_1	Soil	5.0-6.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river central to the site
B9_2	Soil	10.0-11.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river central to the site
B10_1	Soil	6.0-7.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river northeast corner of the site
B10_2	Soil	10.0-11.0	VOC, SVOC, TAL (including CN and Hg)	Low	1	2012 - Soil Sampling	Along river northeast corner of the site
B1_GW	Groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Upgradient and southwest corner of the site
B2_GW	Groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Upgradient and northwest corner of the site
B3_GW	Groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of above ground storage tanks
B4_GW	Groundwater	8	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of underground storage tanks
B5_GW: B5_GWdup	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1 and field duplicate	2007 – Groundwater Well Sampling	Downgradient of underground storage tanks
B6_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of potential underground pipes
B7_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Downgradient of potential underground pipes
B8_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Along river southeast corner of the site
B9_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Along river central to the site
B10_GW	Groundwater	12	VOC, SVOC, TAL (including CN and Hg)	Low	1	2007 – Groundwater Well Sampling	Along river northeast corner of the site

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #21).

QAPP Worksheet #18-2
Sampling Locations and Methods/SOP Requirements Table (2011 Sampling)

Sampling Location/ID Number	Matrix	Depth (Feet)	Analytical Group	Concentration Level	Number of Samples (identify field duplicates)	Sampling SOP Reference¹	Rationale for Sampling Location
11 Surface soil sampling locations	Soil	0-3 inches	PCBs, Dioxin	Low	11 (1)	2012- Soil Sampling	Judgmental
Monitor Wells 1, 2 and 3	Groundwater	To be determined	VOC, SVOC	Low	3 (1)	2007 – Groundwater Well Sampling	Along river central to the site
Building #7 Basement, up to 3 locations (TBD)	Sediment	0-2	VOC, SVOC	Low	2 (1)	2016- Sediment Sampling	Judgmental
Passaic River adjacent to the site, 10 locations	Sediment	1.5-2.5 and 3.5-4.5	VOC, SVOC, Pb, TOC, grain size	Low	20 (1)	2016-Sediment Sampling	Judgmental
Passaic River adjacent to the site, 10 locations	Sediment Pore Water	3.5-4.5	VOC, SVOC, Pb	Low	10 (1)	2007 – Groundwater Well Sampling	Judgmental

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #21).

QAPP Worksheet #19
Analytical SOP Requirements Table

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/analysis)
Soil (2010)	21	VOC	Low	SOM01.2	15 grams	(3) 40-mL vials with 5 g soil & stir bar	Cool to 4°C	48 hours (from time of sample collection)
	21	SVOC	Low	SOM01.2	100 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4°C	14 days extract; 40 days analyze
	21	Metals	Low	ILM05.4	100 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4°C	180 days (Hg-28 days) (CN 14 days)
Soil (2011)	11	TCL Aroclors	Low	SOM01.2	100 grams	(1) 8 oz. glass jar w/Teflon lined cap	Cool to 4°C	10 days extract from VTSR, 40 days to analyze
	11	Dioxin	Low	SW-846 Method 8290A	10 grams	(1) 8 oz amber	Cool to 4°C, light protected	30 days extraction, 45 days analysis
Sediment (2011)	22	VOC	Low	SOM01.2	15 grams	(3) 40-mL vials with 5 g soil & stir bar	Cool to 4°C	48 hours (from time of sample collection)
	22	SVOC	Low	SOM01.2	100 grams	(1) 8 oz. glass jar w/Teflon line cap	Cool to 4°C	10 days extraction, 40days analyze
	20	TOC	Low	EPA SOP C-83	250 mL	(1) 8 oz. glass jar w/Teflon line cap	Cool to 4°C	28 days
	20	Pb	Low	ILM05.4	100 grams	(1) 4 oz. glass jar w/Teflon lined cap	Cool to 4°C	180 days
	20	Grain site	NA	EPA SOP BIO-8.3	100grams (500 grams if gravel is present)	(1) 16 oz. glass jar w/Teflon lined cap	NA	NA

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/analysis)
Aqueous (2010)	11	VOC	Trace or Low	SOM01.2	120 ml	(3) 40 ml vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
	11	SVOC	Low	SOM01.2	1000 ml	(2) 1L amber glass bottles w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	11	Metals	Low	ILM05.4	250 ml	(1) 1 L HDPE	HNO ₃ to pH<2; cool to 4°C	6 months (Hg-28 days) (CN 14 days)
Aqueous (2011)	13	VOC	Trace or Low	SOM01.2	120 ml	(3) 40 ml vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
	13	SVOC	Low	SOM01.2	1000 ml	(2) 1L amber glass bottles w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	10	Pb	Low	ILM05.4	250 ml	(1) 1 L HDPE	HNO ₃ to pH<2; cool to 4°C	6 months
Equipment Blanks (2010)	1	VOC	Low	SOM01.2	120 ml	(3) 40 ml vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days
	1	SVOC	Low	SOM01.2	1000 ml	(2) 1L amber glass bottles w/Teflon lined cap	Cool to 4°C	7 days extract, 40 days analyze
	1	Metals	Low	ILM05.4	250 ml	(1) 1 L HDPE	HNO ₃ to pH<2; cool to 4°C	6 months (Hg-28 days) (CN 14 days)
Trip Blanks	1 per shipment	VOC	Low	SOM01.2	120 ml	(4) 40 ml VOA vials w/Teflon lined septum	1:1 HCl to pH<2; cool to 4°C	14 days

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Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference ¹	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/analysis)
Field Blanks	1 per sampling day	SVOC	Low	SOM01.2	1000mL	(1) 1-L amber glass bottle w/Teflon-lined cap	cool to 4°C	7 days extraction, 40 days analysis

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).

QAPP Worksheet #20-1
Field Quality Control Sample Summary Table (2010 Sampling)

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., MS/MSD) Samples	No. of Field/ Equipment Blanks	No. of Trip. Blanks	No of PE Samples
Soil	VOC	Low	SOM01.2	20	1	1	1	NA	NA
	SVOC	Low	SOM01.2	20	1	1	1	NA	NA
	TAL Metals CN	Low	ILM05.4	20	1 1	1 1	1 1	NA	NA
Aqueous	VOC	Low	SOM01.2	10	1	1	1	1	NA
	SVOC	Low	SOM01.2	10	1	1	1	NA	NA
	TAL Metals CN	Low	ILM05.4	10	1 1	1 1	1 1	NA	NA

QAPP Worksheet #20-2
Field Quality Control Sample Summary Table (2011 Sampling)

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., MS/MSD) Samples	No. of Field/ Equipment Blanks	No. of Trip. Blanks	No of PE Samples
Sediment	VOC	Low	SOM01.2	12	1	1	NA	NA	NA
	SVOC	Low	SOM01.2	12	1	1	NA	NA	NA
	TOC	Low	EPA SOP C-83	10	1	1	NA	NA	NA
	Pb	Low	ILM05.4	10	1	1	NA	NA	NA
	Grain size	NA	EPA SOP BIO-8.3	10	0	0	NA	NA	NA
Soil	TCL Aroclors	Low	SOM01.2	11	1	1	NA	NA	NA
	Dioxin	Low	SW-846 Method 8290A	11	1	1	NA	NA	NA
Aqueous	VOC	Low	SOM01.2	13	1	1	1	1	NA
	SVOC	Low	SOM01.2	13	1	1	1	NA	NA
	Pb (in pore water)	Low	ILM05.4	10	1	1	1	NA	NA

QAPP Worksheet #21
Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
2001	General Field Sampling Guidelines	SERAS	General Sampling	N	
2003	Sample Storage, Preservation and Handling	SERAS	Sample Handling	N	
2006	Sampling Equipment Decontamination	SERAS	Sampling Equipment	N	
2012	Soil Sampling	SERAS	Direct Push	N	
2016	Sediment Sampling	SERASE	Sampling Equipment	N	
2007	Groundwater Well Sampling	SERAS	Sampling Equipment	N	

QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
YSI 650 MDS	Temperature		Compare temperature sensor reading to NIST thermometer measurement	As necessary	Annually	±0.15 degree celsius	Contact manufacturer	Biologist
YSI 650 MDS	pH	Calibrate probe using standards that bracket expected values (pH 4, 7 and 10)	After performing 3-point calibration, immerse probe in pH 7 buffer to make sure it is reading correctly	As necessary	As necessary	±0.05	Recalibrate	Biologist
YSI 650 MDS	Specific Conductance	Calibrate at a temperature of 25 degree Celsius	After performing calibration, immerse probe in standard solution to make sure it is reading correctly	As necessary	As necessary	±10%	Recalibrate	Biologist
YSI 650 MDS	Turbidity	2-point calibration	Insert probe in 10.0 NTU standard	As necessary	As necessary	Between 9.5 and 10.0 NTU	Recalibrate	Biologist
PID	NA	Check/replace battery	NA	Prior to day's activities; anytime anomaly suspected	± 5 ppm	Replace battery; replace probe	Air Team Technician	Manufacturer's manual
Ground Penetrating Radar SmartCart Noggin	Calibrate Odometer with measuring Tape	Keep batteries charged	Comparison with standardized area	Annually	Reproducible data in standardized area	Send to manufacturer for repair and calibration	Martin Ebel SERAS geophysicist	In review

**QAPP Worksheet #23
Analytical SOP References Table**

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
EPA Region II SOP C-88	Total Organic Carbon - Sediments	Definitive	TOC	NA	Region II Laboratory	No
EPA Region II SOP Bio 8.3	Grain Size Hydrometer Method	Definitive	Grain size	NA	Region II Laboratory	No
EPA SW-846 Method 8290A	Polychlorinated Dibenzo-p-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography High-Resolution Mass Spectrometry (HRGC/HRMS)	Definitive	Dioxin/Furans	HRGC/HRMS	Cape Fear Analytical	No
SOM01.2	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Organic Analysis; October 2006	Definitive	TCL Aroclors	GC-ECD	CLP	No
			VOC	GC/MS		
			SVOC	GC/MS		
ILM05.4	USEPA Contract Laboratory Program Statement of Work for Multi-Media, Multi-Concentration Inorganic Analysis; December 2006	Definitive	Metals	ICP-AES	CLP	No
			Mercury	CVAA		
			Cyanide	Spectrophotometer		

QAPP Worksheet #24
Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference ¹
GC/MS	See SOM01.2	Initial calibration: upon award of the contract, whenever the laboratory takes corrective action which may change or affect the initial calibration criteria (e.g., ion source cleaning or repair, column replacement, etc.), or if the continuing calibration acceptance criteria have not been met. Continuing calibration: Once every 12 hours	Initial calibration/ Continuing calibration: relative response factor (RRF) greater than or equal to minimum acceptable response factor listed in Table 5 of procedure; %RSD must be less than or equal to value listed in Table 5 of procedure	Initial calibration: inspect system for problems (e.g., clean ion source, change the column, service the purge and trap device), correct problem, re-calibrate. Continuing calibration: inspect system, recalibrate the instrument, reanalyze samples.	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
GC/ECD	See SOM01.2	Initial calibration: upon award of the contract, whenever major instrument maintenance or modification is performed or if the calibration verification technical acceptance criteria have not been met. Calibration verification: Once every 12 hours	Initial calibration/ Calibration verification: %RSD \leq 20.0, %D \pm 15 for opening CCV and \pm 50% for closing CCV.	Initial calibration: inspect the system correct problem, re-calibrate. Calibration verification: inspect system, recalibrate the instrument, reanalyze samples.	EPA CLP RAS Laboratory GC/ECD Technician	SOM01.2
ICP-AES CVAA	See ILM05.4; as per instrument manufacturer's recommended procedures	ICP-AES Initial calibration: daily or once every 24 hours and each time the instrument is set up. ICP-AES Continuing calibration: beginning and end of run and frequency of 10% or every 2 hours during an analysis run.	ICP-AES: As per instrument manufacturer's recommended procedures, with at least 2 standards.	ICP-AES: inspect the system, correct problem, re-calibrate, and reanalyze samples.	EPA CLP RAS Laboratory ICP-AES Technician	ILM05.4
HRGC/HRMS	See EPA SW-846 Method 8290A	Initial calibration: upon award of the contract, whenever major instrument maintenance or modification is performed or if the calibration verification technical acceptance criteria have not been met. Calibration verification: Once every 12 hours	ICAL: %RSD \pm 20% isotopic ratios within specified limits; S/N ratio \geq 10; isomer specificity resolved with valley \leq 25% in all standards CCAL: %D \pm 20% for unlabeled compounds and \pm 30% for labeled compounds	Inspect system, perform maintenance and re-calibrate	Cape Fear Analytical HRGC/HRMS Chemist	EPA SW-846 Method 8290A

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference¹
Spectro-photometer	See ILM05.4	Daily or once every 24 hours. Blank and minimum of 3 calibration standards. One calibration standard must be at least the CRQL. ICV immediately after calibration CCV every 10 samples and at the end.	$r \geq 0.995$ ICV 85 - 115 CCV 85 - 115	Problem-corrected, instrument recalibrated, calibration verified and reanalysis of samples since last compliant CCV.	EPA CLP RAS Laboratory Wet Chemistry Technician	ILM05.4

¹Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing/Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference¹
GC/MS	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re-calibration; see SOM01.2	Inspect the system, correct problem, re-calibrate and/or reanalyze samples	EPA CLP RAS Laboratory GC/MS Technician	SOM01.2
GC/ECD	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	See SOM01.2; as per instrument manufacturer's recommendations	Acceptable re-calibration; see SOM01.2	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory GC/ECD Technician	SOM01.2
HRGC/HRMS	As per instrument manufacturer's recommendations	As per instrument manufacturer's recommendations	As per instrument manufacturer's recommendations	Acceptable re-calibration; see SW-846 Method 8290A	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	Cape Fear Analytical HRGC/HRMS Chemist	EPA SW-846 Method 8290A
ICP-AES/CVAA	As per instrument manufacturer's recommendations	As per instrument manufacturer's recommendations; check connections	As per instrument manufacturer's recommendations	Acceptable re-calibration; see ILM05.4	Inspect the system, correct problem, re-calibrate and/or reanalyze samples.	EPA CLP RAS Laboratory ICP-AES / ICP-MS Technician	ILM05.4

¹Specify the appropriate reference letter or number from Analytical SOP References table (Worksheet #23).

**QAPP Worksheet #26
Sample Handling System**

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Martin Ebel, Neil Kaufman, Chris French, Jianwei Huang, Scott Grossman/SERAS
Sample Packaging (Personnel/Organization): Martin Ebel, Chris French, Jianwei Huang, Scott Grossman/SERAS
Coordination of Shipment (Personnel/Organization): Martin Ebel, Chris French, Jianwei Huang, Scott Grossman/SERAS
Type of Shipment/Carrier: Federal Express, and personal delivery
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory and Cape Fear Analytical
Sample Custody and Storage (Personnel/Organization): Sample Custodian, EPA CLP RAS Laboratory and Cape Fear Analytical
Sample Preparation (Personnel/Organization): EPA CLP RAS Laboratory and Cape Fear Analytical
Sample Determinative Analysis (Personnel/Organization): Sample Technicians, EPA CLP RAS Laboratory and Cape Fear Analytical
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples to be shipped the same day as collected, and arrive at laboratory within 24 hours (1 day) of being sampled.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): NA
Biological Sample Storage (No. of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Sample Technicians, EPA CLP RAS Laboratory and Cape Fear Analytical
Number of Days from Analysis: According to CLP Laboratory protocols and Cape Fear Analytical protocols

QAPP Worksheet #27
Sample Custody Requirements

Sample Identification Procedures: Each sample will be labeled with the site identification code [02PC] and a sample type letter code and number that depict a specific location. Each sample will also be labeled with a CLP or Non-CLP assigned number. Depending on the type of sample, additional information such as depth, sampling round, date, etc. will be added.

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of-custody (COC) forms, and the samples shipped to the appropriate laboratory via overnight delivery service or courier. Scribe program will be used for field documentation.

Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

QAPP Worksheet #28-1 QC Samples Table

Matrix	Soil and Sediment
Analytical Group	VOC
Concentration Level	Low/Medium
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 every 12 hours	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	59-172 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene	59-172 %R
		Trichloroethene	62-137 %R				Trichloroethene	62-137 %R
		Benzene	66-142 %R				Benzene	66-142 %R
		Toluene	59-139 %R				Toluene	59-139 %R
		Chlorobenzene	60-133 %R				Chlorobenzene	60-133 %R
Matrix Spike Duplicate	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	0-22 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	1,1-Dichloroethene	0-22 %RPD
		Trichloroethene	0-24 %RPD				Trichloroethene	0-24 %RPD
		Benzene	0-21 %RPD				Benzene	0-21 %RPD
		Toluene	0-21 %RPD				Toluene	0-21 %RPD
		Chlorobenzene	0-21 %RPD				Chlorobenzene	0-21 %RPD
Deuterated Monitoring Compounds	all samples	Vinyl chloride-d3	68-122 %R	Check calculations and instruments, reanalyze affected samples up to 3 DMCs per sample may fail to meet necessary limits (Section 11.3.4, Page D45/SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Vinyl chloride-d3	68-122 %R
		Chloroethane-d5	61-130 %R				Chloroethane-d5	61-130 %R

*with the exception of methylene chloride, 2-butanone & acetone which can be up to 2 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

**QAPP Worksheet #28-1
QC Samples Table
(Continued)**

Matrix	Soil and Sediment
Analytical Group	VOC
Concentration Level	Low/Medium
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	45-132 %R	Check calculations and instruments, reanalyze affected samples; up to 3 DMCs per sample may fail to meet necessary limits (Section 11.3.4, Page D45 of SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene-d2	45-132 %R
		2-Butanone-d5	20-182 %R				2-Butanone-d5	20-182 %R
		Chloroform-d	72-123 %R				Chloroform-d	72-123 %R
		1,2-Dichloroethane-d4	79-122 %R				1,2-Dichloroethane-d4	79-122 %R
		Benzene-d6	80-121 %R				Benzene-d6	80-121 %R
		1,2-Dichloropropane-d6	74-124 %R				1,2-Dichloropropane-d6	74-124 %R
		Toluene-d8	78-121 %R				Toluene-d8	78-121 %R
		trans-1,3-Dichloropropene-d4	72-130 %R				trans-1,3-Dichloropropene-d4	72-130 %R
		2-Hexanone-d5	17-184 %R				2-Hexanone-d5	17-184 %R
		1,4-Dioxane-d8	50-150 %R				1,4-Dioxane-d8	50-150 %R
		1,1,2,2-Tetrachloroethane-d2	56-161 %R				1,1,2,2-Tetrachloroethane-d2	56-161 %R

QAPP Worksheet #28-2 QC Samples Table

Matrix	Soil and Sediment
Analytical Group	SVOC
Concentration Level	Low/Medium
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per \leq 20 samples or whenever samples extracted	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike	1 per \leq 20 samples; if requested	Phenol	26-90 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol	26-90 %R
		2-Chlorophenol	25-102 %R				2-Chlorophenol	25-102 %R
		N-Nitroso-di-n-propylamine	41-126 %R				N-Nitroso-di-n-propylamine	41-126 %R
		4-Chloro-3-methylphenol	26-103 %R				4-Chloro-3-methylphenol	26-103 %R
		Acenaphthene	31-137 %R				Acenaphthene	31-137 %R
		4-Nitrophenol	11-114 %R				4-Nitrophenol	11-114 %R
		2,4-Dinitrotoluene	28-89 %R				2,4-Dinitrotoluene	28-89 %R
		Pentachloro-phenol	17-109 %R				Pentachloro-phenol	17-109 %R
		Pyrene	35-142 %R				Pyrene	35-142 %R
Matrix Spike Duplicate	1 per \leq 20 samples; if requested	Phenol	0-35 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	Phenol	0-35 %RPD
		2-Chlorophenol	0-50 %RPD				2-Chlorophenol	0-50 %RPD
		N-Nitroso-di-n-propylamine	0-38 %RPD				N-Nitroso-di-n-propylamine	0-38 %RPD

*with the exception of bis (2-Ethylhexyl) phthalate which can be up to 5 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

QAPP Worksheet #28-2 QC Samples Table

Matrix	Soil and Sediment
Analytical Group	SVOC
Concentration Level	Low/Medium
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Matrix Spike Duplicate [cont'd]	1 per ≤ 20 samples; if requested	4-Chloro-3- methylphenol	0-33 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	4-Chloro-3- methylphenol	0-33 %RPD
		Acenaphthene	0-19 %RPD				Acenaphthene	0-19 %RPD
		4-Nitrophenol	0-50 %RPD				4-Nitrophenol	0-50 %RPD
		2,4-Dinitrotoluene	0-47 %RPD				2,4-Dinitrotoluene	0-47 %RPD
		Pentachloro-phenol	0-47 %RPD				Pentachloro-phenol	0-47 %RPD
		Pyrene	0-36 %RPD				Pyrene	0-36 %RPD
Deuterated Monitoring Compounds	all samples	Phenol-d5	17-103 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits (Section 11.3.4, Page D48/SVOC of SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol-d5	17-103 %R
		Bis(2-chloroethyl)ether- d8	12-98 %R				Bis(2-chloroethyl)ether- d8	12-98 %R
		2-Chlorophenol-d4	13-101 %R				2-Chlorophenol-d4	13-101 %R
		4-Methylphenol-d8	8-100 %R				4-Methylphenol-d8	8-100 %R
		Nitrobenzene-d5	16-103 %R				Nitrobenzene-d5	16-103 %R
		2-Nitrophenol-d4	16-104 %R				2-Nitrophenol-d4	16-104 %R

QAPP Worksheet #28-2 QC Samples Table

Matrix	Soil and Sediment
Analytical Group	SVOC
Concentration Level	Low/Medium
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	2,4-Dichlorophenol-d3	23-104 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits (Section 11.3.4, Page D48/SVOC of SOM01.2)	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	2,4-Dichlorophenol-d3	23-104 %R
		4-Chloroaniline-d4	1-145 %R				4-Chloroaniline-d4	1-145 %R
		Dimethylphthalate-d6	43-111 %R				Dimethylphthalate-d6	43-111 %R
		Acenaphthylene-d8	20-97 %R				Acenaphthylene-d8	20-97 %R
		4-Nitrophenol-d4	16-166 %R				4-Nitrophenol-d4	16-166 %R
		Fluorene-d10	40-108 %R				Fluorene-d10	40-108 %R
		4,6-Dinitro-2-methylphenol-d2	1-121 %R				4,6-Dinitro-2-methylphenol-d2	1-121 %R
		Anthracene-d10	22-98 %R				Anthracene-d10	22-98 %R
		Pyrene-d10	51-120 %R				Pyrene-d10	51-120 %R
		Benzo(a)pyrene-d12	43-111 %R				Benzo(a)pyrene-d12	43-111 %R

QAPP Worksheet #28-2
QC Samples Table

Matrix	Soil and Sediment
Analytical Group	SVOC
Concentration Level	Low/Medium
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Internal Standards	all samples	50-200% of area, \pm 30 sec retention time shift	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	50-200% of area, \pm 30 sec retention time shift

QAPP Worksheet #28-3 QC Samples Table

Matrix	Soil and Sediment
Analytical Group	Target Analyte List Inorganics – Metals
Concentration Level	Low
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	1 per \leq 20 samples	No constituent > CRQL	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	No constituent > CRQL
Spike	1 per \leq 20 samples	75-125%R*	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R*
Duplicate	1 per \leq 20 samples	\pm 20% RPD**	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Precision	\pm 20% RPD**
Post-Digestion Spike	after any analyte (except Ag and Hg) fails spike %R	75-125%R	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically during run (2 times every 8 hours)	Within \pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Sensitivity	Within \pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater

*except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken

**Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**except when the sample and/or duplicate concentrations are less than 5 times the CRQL, then \pm CRQL.

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QAPP Worksheet #28-3 QC Samples Table

Matrix	Soil and Sediment
Analytical Group	Target Analyte List Inorganics – Metals
Concentration Level	Low
Sampling SOP(s)	SERAS SOPs #2012 and #2016
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	36

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per \leq 20 samples	Control limits established by EPA*	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	Control limits established by EPA*

* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

QAPP Worksheet #28-4 QC Samples Table

Matrix	Soil
Analytical Group	Target Analyte List Inorganics –Total Mercury
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	ILM05.4 – Cold Vapor Atomic Absorption (CVAA)
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per ≤ 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per ≤ 20 samples	$\pm 20\%$ RPD	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm 20\%$ RPD
Spike Sample	1 per ≤ 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R
Laboratory Control Sample	1 ≤ 20 samples	Control limits established by EPA*	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	Control limits established by EPA*

* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

QAPP Worksheet #28-5 QC Samples Table

Matrix	Soil
Analytical Group	Target Analyte List Inorganics – Total Cyanide
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	ILM05.4 – Colorimeter or Spectrophotometer
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	20

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per ≤ 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per ≤ 20 samples	$\pm 20\%$ RPD	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	$\pm 20\%$ RPD
Spike Sample	1 per ≤ 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R
Laboratory Control Sample	1 ≤ 20 samples	Control limits established by EPA*	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	Control limits established by EPA*

* If the EPA LCS is unavailable, other EPA QC samples or other certified materials may be used. In such cases, control limits for the LCS must be documented and provided.

QAPP Worksheet #28-6 QC Samples Table

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 every 12 hours	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL*	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	61-145 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1- Dichloroethene	61-145 %R
		Benzene	76-127 %R				Benzene	76-127 %R
		Trichloroethene	71-120 %R				Trichloroethene	71-120 %R
		Toluene	76-125 %R				Toluene	76-125 %R
		Chlorobenzene	75-130 %R				Chlorobenzene	75-130 %R
Matrix Spike Duplicate (Not Required)	1 per ≤ 20 samples; if requested	1,1-Dichloroethene	0-14 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	1,1- Dichloroethene	0-14 %RPD
		Benzene	0-11 %RPD				Benzene	0-11 %RPD
		Trichloroethene	0-14 %RPD				Trichloroethene	0-14 %RPD

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
		Toluene	0-13 %RPD				Toluene	0-13 %RPD
		Chlorobenzene	0-13 %RPD				Chlorobenzene	0-13 %RPD
	all samples	Vinyl chloride-d3	65-131 %R	Check calculations and instruments, reanalyze affected samples; see asterisk below	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Vinyl chloride-d3	65-131 %R
		Chloroethane-d5	71-131 %R				Chloroethane-d5	71-131 %R

*with the exception of methylene chloride, 2-butanone and acetone which can be up to 2 times the CRQL.

**QAPP Worksheet #28-6
QC Samples Table**

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,1-Dichloroethene-d2	55-104 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,1-Dichloroethene-d2	55-104 %R
		2-Butanone-d5	49-155 %R				2-Butanone-d5	49-155 %R
		Chloroform-d	78-121 %R				Chloroform-d	78-121 %R
		1,2-Dichloroethane-d4	78-129 %R				1,2-Dichloroethane-d4	78-129 %R
		Benzene-d6	77-124 %R				Benzene-d6	77-124 %R
		1,2-Dichloropropane-d6	79-124 %R				1,2-Dichloropropane-d6	79-124 %R
		Toluene-d8	77-121 %R				Toluene-d8	77-121 %R
		trans-1,3-Dichloropropene-d4	73-121 %R				trans-1,3-Dichloropropene-d4	73-121 %R
		2-Hexanone-d5	28-135 %R				2-Hexanone-d5	28-135 %R

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
		1,4-Dioxane-d8	50-150 %R				1,4-Dioxane-d8	50-150 %R
		1,1,2,2-Tetrachloroethane-d2	73-125 %R				1,1,2,2-Tetrachloroethane-d2	73-125 %R

QAPP Worksheet #28-6 QC Samples

Matrix	Aqueous
Analytical Group	VOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	1,2-Dichlorobenzene-d4	80-131 %R	Check calculations and instruments, reanalyze affected samples; *up to 3 DMCs per sample may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	1,2-Dichlorobenzene-d4	80-131 %R
Internal Standards	all samples	60-140%		Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	± 40 % of response area, ± 20 sec retention time shift	

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per ≤ 20 samples OR whenever samples extracted	No analyte > CRQL*		Suspend analysis unit source recertified	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	No analyte > CRQL	
Matrix Spike (Not Required)	1 per ≤ 20 samples; if requested	Phenol	12-110 %R	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Phenol	12-110 %R
		2-Chlorophenol	27-123 %R				2-Chlorophenol	27-123 %R
		N-Nitroso-di-n-propylamine	41-116 %R				N-Nitroso-di-n-propylamine	41-116 %R
		4-Chloro-3-methylphenol	23-97 %R				4-Chloro-3-methylphenol	23-97 %R
		Acenaphthene	46-118 %R				Acenaphthene	46-118 %R
		4-Nitrophenol	29-94 %R				4-Nitrophenol	29-94 %R
		2,4-Dinitrotoluene	24-96 %R				2,4-Dinitrotoluene	24-96 %R
		Pentachlorophenol	9-103 %R				Pentachlorophenol	9-103 %R
		Pyrene	26-127 %R				Pyrene	26-127 %R

*with the exception of bis (2-Ethylhexyl) phthalate which can be up to 5 times the CRQL. (USEPA CLP Nat'l Functional Guidelines, Final, July 2007)

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Matrix Spike Duplicate (Not Required)	1 per \leq 20 samples; if requested	Phenol	0-42 %RPD	Flag outliers	EPA CLP RAS Laboratory GC/MS Technician	Precision	Phenol	0-42 %RPD
		2-Chlorophenol	0-40 %RPD				2-Chlorophenol	0-40 %RPD
		N-Nitroso-di-n-propylamine	0-38 %RPD				N-Nitroso-di-n-propylamine	0-38 %RPD
		4-Chloro-3-methylphenol	0-42 %RPD				4-Chloro-3-methylphenol	0-42 %RPD
		Acenaphthene	0-31 %RPD				Acenaphthene	0-31 %RPD
		4-Nitrophenol	0-50 %RPD				4-Nitrophenol	0-50 %RPD
		2,4-Dinitrotoluene	0-38 %RPD				2,4-Dinitrotoluene	0-38 %RPD
		Pentachlorophenol	0-50 %RPD				Pentachlorophenol	0-50 %RPD
		Pyrene	0-31 %RPD				Pyrene	0-31 %RPD
Deuterated Monitoring	all samples	Phenol-d5	39-106 %R	Check calculations	EPA CLP RAS Laboratory	Accuracy	Phenol-d5	39-106 %R
		Bis(2-chloroethyl)ether-d8	40-105 %R				Bis(2-chloroethyl)ether-d8	40-105 %R

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Compounds		2-Chlorophenol-d4	41-106 %R	and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	GC/MS Technician		2-Chlorophenol-d4	41-106 %R

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	4-Methylphenol-d8	25-111 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	4-Methylphenol-d8	25-111 %R
		Nitrobenzene-d5	43-108 %R				Nitrobenzene-d5	43-108 %R
		2-Nitrophenol-d4	40-108 %R				2-Nitrophenol-d4	40-108 %R
		2,4-Dichlorophenol-d3	37-105 %R				2,4-Dichlorophenol-d3	37-105 %R
		4-Chloroaniline-d4	1-145 %R				4-Chloroaniline-d4	1-145 %R
		Dimethylphthalate-d6	47-114 %R				Dimethylphthalate-d6	47-114 %R
		Acenaphthylene-d8	41-107 %R				Acenaphthylene-d8	41-107 %R
		4-Nitrophenol-d4	33-116 %R				4-Nitrophenol-d4	33-116 %R
		Fluorene-d10	42-111 %R				Fluorene-d10	42-111 %R
		4,6-Dinitro-2-methylphenol-d2	22-104 %R				4,6-Dinitro-2-methylphenol-d2	22-104 %R
		Anthracene-d10	44-110 %R				Anthracene-d10	44-110 %R
		Pyrene-d10	52-119 %R				Pyrene-d10	52-119 %R

QAPP Worksheet #28-7 QC Samples Table

Matrix	Aqueous
Analytical Group	SVOC
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	23

Lab QC Sample:	Frequency / Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Deuterated Monitoring Compounds [cont'd]	all samples	Benzo(a)pyrene-d12	32-121 %R	Check calculations and instruments, reanalyze affected samples; up to 4 DMCs may fail to meet recovery limits	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	Benzo(a)pyrene-d12	32-121 %R
Internal Standards	all samples	50-100% of area, \pm 20 sec retention time shift		Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory GC/MS Technician	Accuracy	50-100% of area, \pm 20 sec retention time shift	

QAPP Worksheet #28-8 QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics Metals
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank	1 per \leq 20 samples	No constituent > CRQL	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	No constituent > CRQL
Spike	1 per \leq 20 samples	75-125%R*	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R*
Duplicate	1 per \leq 20 samples	\pm 20% RPD**	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Precision	\pm 20% RPD**
Post-Digestion Spike	after any analyte (except Ag and Hg) fails spike %R	75-125%R	Flag outliers	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	75-125%R
Interference Check Sample [ICP Analysis Only]	beginning, end and periodically (not less than once per 20 samples)	\pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater	Check calculations and instruments, reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Sensitivity	\pm 2 times CRQL of true value or \pm 20% of true value, whichever is greater

*except when the sample concentration is greater than 4 times the spike concentration, then disregard the recoveries; no data validation action taken

**Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

**except when the sample and/or duplicate concentration is less than 5 times the CRQL, then \pm CRQL.

QAPP Worksheet #28-8 QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics Metals
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per \leq 20 samples	80-120%R (except Ag and Sb)	Suspend analysis until source rectified; redigest and reanalyze affected samples	EPA CLP RAS Laboratory ICP-AES/ICP-MS Technician	Accuracy	80-120%R (except Ag and Sb)

QAPP Worksheet #28-9
QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics – Total Mercury
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4 – Cold Vapor Atomic Absorption (CVAA)
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per \leq 20 samples	No analyte > CRQL	Suspend analysis; redigest and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per \leq 20 samples	\pm 20% RPD*	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	\pm 20% RPD
Spike Sample	1 per \leq 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

QAPP Worksheet #28-10
QC Samples Table

Matrix	Aqueous
Analytical Group	Target Analyte List Inorganics - Total Cyanide
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2007
Analytical Method/SOP Reference	ILM05.4 – Colorimeter or Spectrophotometer
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Preparation Blank (PB)	1 per \leq 20 samples	No analyte > CRQL	Suspend analysis; redistill and reanalyze	EPA CLP RAS Laboratory Technician	Accuracy	No analyte > CRQL
Duplicate Sample	1 per \leq 20 samples	\pm 20% RPD*	Flag outliers	EPA CLP RAS Laboratory Technician	Precision	\pm 20% RPD
Spike Sample	1 per \leq 20 samples	75 – 125 %R	Flag outliers	EPA CLP RAS Laboratory Technician	Accuracy	75 – 125 %R

*Reference USEPA Region 2 SOP No. HW-2, Revision 13/Evaluation of Metals Data for CLP - (include absolute difference criteria)

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QAPP Worksheet #28-11
QC Samples Table

Matrix	Sediment
Analytical Group	Total Organic Carbon (TOC)
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2016
Analytical Method/SOP Reference	EPA DESA Laboratory Method C-88
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA Region 2 DESA Laboratory
No. of Sample Locations	16

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Sample Duplicates	1 per \leq 20 samples	RPD \pm 50%	Rerun sample once for confirmation	EPA Region 2 DESA Laboratory Technician	Precision	RPD \pm 50%
AQC	1 per \leq 20 samples	Recovery 75-125%	Reanalyze associated samples	EPA Region 2 DESA Laboratory Technician	Accuracy	Recovery 75-125%
AQC Duplicates	1 per \leq 20 samples	RPD \pm 20%	Reanalyze associated samples	EPA Region 2 DESA Laboratory Technician	Sensitivity	RPD \pm 20%
Equipment Blank	1 per day	<RL	Report in Final Deliverable	Task Leader	Accuracy/Bias	<RL
Field Duplicates	1 per 20 samples	RPD \pm 40%	Report in Final Deliverable	Task Leader	Precision	RPD \pm 40%

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QAPP Worksheet #28-12
QC Samples Table

Matrix	Sediment					
Analytical Group	Grain Size					
Concentration Level	NA					
Sampling SOP(s)	SERAS SOP #2016					
Analytical Method/SOP Reference	USEPA SOP BIO-8.3					
Sampler's Name	Martin Ebel					
Field Sampling Organization	SERAS					
Analytical Organization	EPA Region 2 DESA Laboratory					
No. of Sample Locations	16					
Lab QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Lab Duplicates	1 : 20 Samples	RPD \pm 50% for Duplicate Values	Reanalyze if sufficient sample is available	EPA Region 2 DESA Laboratory Technician	Precision	RPD \pm 50% for Duplicate Values

QAPP Worksheet #28-13
QC Samples Table

Matrix	Soil
Analytical Group	TCL Aroclors
Concentration Level	Low
Sampling SOP(s)	SERAS SOP #2012
Analytical Method/SOP Reference	SOM01.2
Sampler's Name	Martin Eble
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	10

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits		Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria	
Method Blank	1 per \leq 20 samples or whenever samples extracted	< CRQL		Suspend analysis until source of contamination identified, reanalyze	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy/Bias (Contamination)	No analyte > CRQL	
Matrix Spike	1 per \leq 20 samples	Aroclor-1016	%R: 29-135	None – limits are advisory only	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy/Bias	No analyte > CRQL	29-135 %R
		Aroclor-1260	%R: 29-135				Aroclor-1016	%R: 29-135
MS/MSD	1 per \leq 20 samples	Aroclor-1016	%RPD: 0-15	Reextract batch if outside QC limits	EPA CLP RAS Laboratory GC/ECD Technician	Precision	Aroclor-1260	%R: 29-135
		Aroclor-1260	%RPD: 0-15				Aroclor-1016	%RPD: 0-15
LCS	1 per \leq 20 samples	Aroclor-1016	%R: 50-150	Reextract batch if outside QC limits	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy/Bias	Aroclor-1260	%RPD: 0-15
		Aroclor-1260	%R: 50-150				Aroclor-1016	%R: 50-150
Surrogates	Each samples	%R: 30-150		None – limits are advisory only	EPA CLP RAS Laboratory GC/ECD Technician	Accuracy/Bias	30-150%R	
Field Duplicate	5%	%RPD \pm 35		Document in Final Report	Task Leader	Precision	%RPD \pm 35	

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QAPP Worksheet #28-14
QC Samples Table

Matrix	Soil and Sediment
Analytical Group	Dioxins/Furans
Concentration Level	Low
Sampling SOP(s)	SERAS SOPs #2012 /2016
Analytical Method/SOP Reference	SW-846 Method 8290A
Sampler's Name	Martin Ebel
Field Sampling Organization	SERAS
Analytical Organization	EPA CLP RAS Laboratory
No. of Sample Locations	13

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per \leq 20 samples or whenever samples extracted	< RL	Suspend analysis until source of contamination identified, reanalyze	Cape Fear Analytical Chemist	Accuracy/Bias (Contaminatio n)	<RL
Field Duplicate	5%	NA	Document in Final Report	Task Leader	Precision	%RPD \pm 35

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Laboratory Control Sample	1 per 20 samples	2378-TCDD – 70-130% 2378-TCDF – 70-130% 12378-PeCDD – 70-130% 12378-PeCDF – 70-130% 23478-PeCDF – 70-130% 123478-HxCDD – 70-130% 123678-HxCDD – 70-130% 123789-HxCDD – 70-130% 123478-HxCDF – 70-130% 123678-HxCDF – 70-130% 123789-HxCDF – 70-130% 234678-HxCDF – 70-130% 1234678-HpCDD – 70-130% 1234678-HpCDF – 70-130% 1234789-HpCDF – 70-130% OCDD – 70-130% OCDF – 70-130%	Flag outliers	Cape Fear Analytical Chemist	Accuracy	2378-TCDD – 70-130% 2378-TCDF – 70-130% 12378-PeCDD – 70-130% 12378-PeCDF – 70-130% 23478-PeCDF – 70-130% 123478-HxCDD – 70-130% 123678-HxCDD – 70-130% 123789-HxCDD – 70-130% 123478-HxCDF – 70-130% 123678-HxCDF – 70-130% 123789-HxCDF – 70-130% 234678-HxCDF – 70-130% 1234678-HpCDD – 70-130% 1234678-HpCDF – 70-130% 1234789-HpCDF – 70-130% OCDD – 70-130% OCDF – 70-130%
Labeled Compounds	All Samples	¹³ C ₁₂ -2378-TCDD – 40-135% ¹³ C ₁₂ -2378-TCDF – 40-135% ¹³ C ₁₂ -12378-PeCDD – 40-135% ¹³ C ₁₂ -12378-PeCDF – 40-135% ¹³ C ₁₂ -23478-PeCDF – 40-135% ¹³ C ₁₂ -123478-HxCDD – 40-135% ¹³ C ₁₂ -123678-HxCDD – 40-135% ¹³ C ₁₂ -123478-HxCDF – 40-135% ¹³ C ₁₂ -123678-HxCDF – 40-135% ¹³ C ₁₂ -123789-HxCDF – 40-135% ¹³ C ₁₂ -234678-HxCDF – 40-135% ¹³ C ₁₂ -1234678-HpCDD – 40-135% ¹³ C ₁₂ -1234678-HpCDF – 40-135% ¹³ C ₁₂ -1234789-HpCDF – 40-135% ¹³ C ₁₂ -OCDD – 40-135% ¹³ C ₁₂ -OCDF – 40-135%	Flag outliers	Cape Fear Analytical Chemist	Accuracy	¹³ C ₁₂ -2378-TCDD – 40-135% ¹³ C ₁₂ -2378-TCDF – 40-135% ¹³ C ₁₂ -12378-PeCDD – 40-135% ¹³ C ₁₂ -12378-PeCDF – 40-135% ¹³ C ₁₂ -23478-PeCDF – 40-135% ¹³ C ₁₂ -123478-HxCDD – 40-135% ¹³ C ₁₂ -123678-HxCDD – 40-135% ¹³ C ₁₂ -123478-HxCDF – 40-135% ¹³ C ₁₂ -123678-HxCDF – 40-135% ¹³ C ₁₂ -123789-HxCDF – 40-135% ¹³ C ₁₂ -234678-HxCDF – 40-135% ¹³ C ₁₂ -1234678-HpCDD – 40-135% ¹³ C ₁₂ -1234678-HpCDF – 40-135% ¹³ C ₁₂ -1234789-HpCDF – 40-135% ¹³ C ₁₂ -OCDD – 40-135% ¹³ C ₁₂ -OCDF – 40-135%

Lab QC Sample:	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS/LCSD	1 per 20 samples	RPD±20%	Flag outliers	Cape Fear Analytical Chemist	Precision	RPD±20%
MS	1 per 20 samples	2378-TCDD – 70-130% 2378-TCDF – 70-130% 12378-PeCDD – 70-130% 12378-PeCDF – 70-130% 23478-PeCDF – 70-130% 123478-HxCDD – 70-130% 123678-HxCDD – 70-130% 123789-HxCDD – 70-130% 123478-HxCDF – 70-130% 123678-HxCDF – 70-130% 123789-HxCDF – 70-130% 234678-HxCDF – 70-130% 1234678-HpCDD – 70-130% 1234678-HpCDF – 70-130% 1234789-HpCDF – 70-130% OCDD – 70-130% OCDF – 70-130%	Flag outliers	Cape Fear Analytical Chemist	Accuracy/Bias	2378-TCDD – 70-130% 2378-TCDF – 70-130% 12378-PeCDD – 70-130% 12378-PeCDF – 70-130% 23478-PeCDF – 70-130% 123478-HxCDD – 70-130% 123678-HxCDD – 70-130% 123789-HxCDD – 70-130% 123478-HxCDF – 70-130% 123678-HxCDF – 70-130% 123789-HxCDF – 70-130% 234678-HxCDF – 70-130% 1234678-HpCDD – 70-130% 1234678-HpCDF – 70-130% 1234789-HpCDF – 70-130% OCDD – 70-130% OCDF – 70-130%
MS/MSD	1 per 20 samples	RPD±20%	Flag outliers	Cape Fear Analytical Chemist	Precision	RPD±20%
Recovery Standards	Each Sample	¹³ C ₁₂ -1234-TCDD: 50-200% ¹³ C ₁₂ -1234789-HxCDD: 50-200%	Flag outliers	Cape Fear Analytical Chemist	Accuracy/Bias	¹³ C ₁₂ -1234-TCDD: 50-200% ¹³ C ₁₂ -1234789-HxCDD: 50-200%

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QAPP Worksheet #29
Project Documents and Records Table

Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
Chain of custody records Sample labels Custody seals Site Logbook Air Bills	Sample receipt logs Internal and external COC forms Equipment calibration logs Sample preparation worksheets/logs Sample analysis worksheets/run logs Telephone/email logs Corrective action documentation Analytical Results	Data validation reports Field inspection checklist(s) Laboratory Audit checklist (if performed) Review forms for electronic entry of data into database Corrective action documentation	Trip Report Analytical Report (for dioxin only)

QAPP Worksheet #30
Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Sample Location/ID Numbers	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	TCL VOCs TCL SVOCs PCBs	Low	SOM01.2	See Worksheet #18	6 weeks	CLP-assigned Laboratory	NA
	TAL Metals Cyanide	Low	ILM05.4	See Worksheet #18	6 weeks	CLP-assigned Laboratory	NA
	Dioxin	Low	SW-846 Method 8290A	See Worksheet #18	6 weeks	Cape Fear Analytical	NA
Aqueous	TCL VOCs TCL SVOCs TAL Metals Cyanide	Low	SOM01.2 ILM05.4	See Worksheet #18	6 weeks	CLP-assigned Laboratory	NA
Sediment	TCL VOCs TCL SVOCs	Low	SOM01.2	See Worksheet #18	6 weeks	CLP-assigned Laboratory	NA
	Lead	Low	ILM05.4	See Worksheet #18	6 weeks	CLP-assigned Laboratory	NA
	TOC	Low	USEPA SOP C-88	See Worksheet 18	28 Days	EPA Region 2 DESA Laboratory	NA
	Grain size	NA	USEPA SOP BIO-8.3	See Worksheet 18	28 Days	EPA Region 2 DESA Laboratory	NA

QAPP Worksheet #31
Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
Laboratory Technical Systems/ Performance Audits	NA	External	Regulatory Agency	Regulatory Agency	EPA CLP RAS Laboratory	EPA CLP RAS Laboratory	EPA or other Regulatory Agency
Performance Evaluation Samples	NA	External	Regulatory Agency	Regulatory Agency	EPA CLP RAS Laboratory	EPA CLP RAS Laboratory	EPA or other Regulatory Agency
Laboratory Technical Systems/ Performance Audits	NA	External	Regulatory Agency	Regulatory Agency	Cape Fear Analytical	Cape Fear Analytical	Cape Fear Analytical
Performance Evaluation Samples	NA	External	Regulatory Agency	Regulatory Agency	Cape Fear Analytical	Cape Fear Analytical	Cape Fear Analytical

NA = Not Available

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QAPP Worksheet #32
Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Project Readiness Review	Checklist or logbook entry	Martin Ebel, Task Leader, SERAS	Immediately to within 24 hours of review	Checklist or logbook entry	Martin Ebel, Task Leader, SERAS	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	Logbook	Martin Ebel, Task Leader, SERAS	Immediately to within 24 hours of deviation	Logbook	Martin Ebel, Task Leader, SERAS and EPA RPM	Immediately to within 24 hours of deviation
Laboratory Technical Systems/ Performance Audits	Written Report	EPA CLP Laboratory	30 days	Letter	EPA CLP Laboratory	14 days
On-Site Field Inspection	Written Report	Martin Ebel, Task Leader, SERAS	7 calendar days after completion of the audit	Letter/Internal Memorandum	Martin Ebel, Task Leader, SERAS and EPA RPM	To be identified in the cover letter of the report
Performance Evaluation Samples	Electronic Report	EPA CLP Laboratory	30 days	Letter or Written Report	EPA CLP Laboratory	14 days

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QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Technical Report	Monthly	10 th of the Month following each performance period	SERAS TL	ERT Project Officer & WAM
QA Report	Quarterly	February, May, August and November	SERAS QA/QC Officer	ERT Project Officer & Quality Coordinator

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QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain-of-custody record	Original chain-of-custody records will be reviewed for correctness and completeness prior to submittal of samples to the laboratory.	Internal	Martin Ebel, SERAS
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	External	CLP Laboratories/Cape Fear Analytical
	Reviewed for measurement performance criteria	External/Internal	ESAT Contractor/SERAS QA/QC Chemist
Trip Report	Deliverable will be reviewed to verify that transcription errors are not present.	Internal	Peer review team
Analytical Report	Deliverable will be reviewed to verify that transcription errors are not present.	Internal	QA/QC Chemist, Analytical Support Leader, QA/QC Officer, Program Manager

QAPP Worksheet #35
Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	Martin Ebel, SERAS Task Leader
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	ESAT Data Validation Personnel, EPA Region II, ERT WAM
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	ESAT Data Validation Personnel, EPA Region II Martin Ebel, SERAS Task Leader, QA/QC Chemist (dioxin)
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	ESAT Data Validation Personnel, EPA Region II, SERAS QA/QC Chemist (dioxin)
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	ESAT Data Validation Personnel, EPA Region II, SERAS QA/QC Chemist (dioxin)
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	Martin Ebel, SERAS Task Leader Don Bussey, ERT WAM

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa/IIb	Soil/Sediment	PCBs	Low	Data Validation SOP of Organic Analysis of Low/Medium Aroclors under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
IIa/IIb	Soil/Sediment	Dioxins	Low	SERAS SOP #1019, Data Validation Procedures for Dioxin/Furan Analysis by HRGC/HRMS	SERAS QA/QC Group
IIa/IIb	Sediment	TOC	Low	Per EPA SOP C-83	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
		Grain Size	NA	Per EPA SOP BIO-8.3	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
IIa / IIb	Soil/Sediment/Aqueous	VOCs	Low	Data Validation SOP for Organic Analysis of Low/Medium Concentration VOCs under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
		SVOCs	Low/Medium	Data Validation SOP for Organic Analysis of Low/Medium Concentration SVOCs under SOW SOM01.2	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel
		Metals/Cyanide	Low/Medium	Data Validation SOP for Inorganic Analysis of Low/Medium Concentration Total Metals under SOW ILM0 5.4	ESAT Data Validation Personnel, EPA Region 2 Data Validation Personnel

QAPP Worksheet #37

Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: The soil analytical data will be correlated with the MIPs data using least mean squared error procedures and usability will be based on the degree of correlation. The usability of the groundwater analytical data will be determined through standard contouring procedures
Describe the evaluative procedures used to assess overall measurement error associated with the project: The measurement error will be determined based on standard laboratory procedures, such as analysis of field duplicates and matrix spike and matrix spike duplicates.
Identify the personnel responsible for performing the usability assessment: EPA Region 2, ERT WAM, SERAS
Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:

Precision: Results of laboratory duplicates will be assessed during data validation and data will be qualified according to the data validation procedures cited in worksheet# 36. Field duplicates will be assessed during by matrix using the RPD for each pair of results above the QL for the performed analyses. RPD acceptance criteria, presented in worksheet #12, will be used to access field sampling precision. Absolute difference will be used for low results as described in worksheet # #28. A discussion summarizing the results of laboratory and field precision and any limitations on the use of the data will be described.

-Accuracy/Bias Contamination: Results for all laboratory blanks will be assessed as part of the data validation. During the data validation process, the validating personnel will qualify the data following the procedures described on worksheet #36. A discussion summarizing the results of the laboratory accuracy and bias based on contamination will be presented and any limitations on the use of the data will be described.

-Overall Accuracy/Bias: The results of instrument calibration and matrix spike recoveries will be reviewed and data will be qualified according to the data validation procedures cited on worksheet #36. A discussion summarizing the results of laboratory accuracy and any limitations on the use of the data will be described.

-Sensitivity: Data results will be compared to criteria provided in worksheet #15. A discussion summarizing any conclusions about the sensitivity of the analyses will be presented and any limitations on the use of the data will be described.

-Representativeness: Data representativeness will be assessed by collecting field replicate samples. The field replicates are by definition equally representative of a given point and space and time. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. Therefore, data representativeness will be satisfied by ensuring that:

The sampling program is followed according to:

U.S. EPA (Environmental Protection Agency). October 1989. *Region II CERCLA Quality Assurance Manual*. Final Copy, Revision 1. Division of

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Environmental Services and Assessment, Edison, NJ; and

U.S. EPA (Environmental Protection Agency). December 1995. *Superfund Program Representative Sampling Guidance*. OSWER Directive 9360.4-10. Interim Final. EPA/540/R-95/141. Office of Emergency and Remedial Response (OERR). Washington, D.C.

U.S. EPA Environmental Response Team. *Standard Operating Procedure 2012 Soil Sampling*, February 2000, *Standard Operating Procedure 2007, Groundwater Well Sampling*, January 1995, *Standard Operating Procedure 2016 Sediment Sampling*, November 2001, *Standard Operating Procedure 2007, Groundwater Well Sampling*, January 1995.

-Comparability: To ensure data comparability, sampling and analysis for all samples will be performed using standardized analytical methods and adherence to the quality control procedures outlined in the methods and this QAPP. Therefore, the data will be comparable.

-Reconciliation: The PQOs presented in worksheet #11 will be examined against the data quality to determine if the objectives were met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of major impacts observed from data validation, data quality indicators, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQOs were met and whether project goals are being achieved. Conclusions will be drawn and any limitations on the usability of the data will be described.

-Completeness: 1. To calculate field precision: $RPD = 100 \times \left(\frac{|X_1 - X_2|}{(X_1 + X_2)/2} \right)$ where X1 and X2 are the reported concentrations for each duplicate or replicate.

2. Calculate completeness: Data completeness will be expressed as the percentage of valid data obtained from measurement system. In other words, every well or location that was initially intended to be sampled, was sampled. For data to be considered valid, it must meet all the acceptable criteria including accuracy and precision, as well as any other criteria specified by the analytical method used. Therefore, all data points critical to the sampling program in terms of completeness will be 100% validated by USEPA Region II DESA/LB according to the appropriate and current US EPA Region 2 Data Validation SOPs G-26. With 100% validation, the rationale for considering data points non-critical is not required

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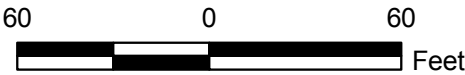
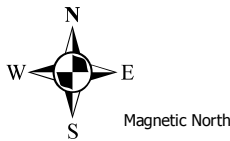
FIGURE 1A
Site Sampling Map
UFP-QAPP for 29 Riverside Avenue Site (Phase 2 Assessment)
February 2011



Map created using 2007 orthoimagery from NJGIN, site survey GPS data.

Map Creation Date: 31 January 2011

Coordinate system: New Jersey State Plane
FIPS: 2900
Datum: NAD83
Units: Feet



Legend

- | | |
|-------------------------------------|--------------------|
| Proposed Sample Location | BLDG |
| ● Near Surface Soil Sample Location | Loading Dock |
| ● Sediment Sample Location | Transformers |
| ● Groundwater Monitor Well Location | UST |
| | Property Block 614 |

D R A F T

U.S EPA Environmental Response Team
Scientific Engineering Response and Analytical Services
EP-W-09-031
W.A.# 0-089

Figure 1A
Site Sampling Map
29 Riverside Ave. (Phase 2 Assessment)
Newark, New Jersey